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ABSTRACT

This curriculum, Academia del Pueblo-Math and Science (ADP-MAS), is an outgrowth of the National Council of La Raza's Project EXCEL, a supplemental educational enrichment model for at-risk Latino students to be operated by Latino community-based organizations or public institutions, including schools with substantial Latino populations. ADP-MAS aims to increase and strengthen informal mathematics and science opportunities for Latino elementary school students by building on lessons learned through the Project EXCEL experience. This curriculum has a strong arts-infused, informal mathematics and science focus, and every unit contains Spanish translations of the unit and lesson overviews, key skills, and essential instructional vocabulary. Parent participation is a major component of the ADP-MAS approach. Because of the low proportion of professional Latino teachers, the curriculum is designed to be implemented by local community-based teachers or para-educators, and the model encourages the use of Latino high school and college students to serve as tutors and teaching assistants. The six curriculum units, each composed of multiple lessons (53 in the entire curriculum), are: (1) "Introduction to Academia"; (2) "The World of Animals"; (3) "Human Habitats"; (4) "The Brilliant Balancing Act"; (5) "Our Weeping World"; and (6) "Me and My World." Thirteen appendixes contain advice for unit teachers and lists of resources and references. (Contains 37 references.) (SLD)

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ADP-MAS

A Math and Science Curriculum

National Council of La Raza

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Preface and Acknowledgments

The Project EXCEL curricula reflect the contributions and insights of many individuals and community-based organizations. Most significant was the contribution of the project originator, Raul Yzaguirre. His vision required the expansion and redefinition of the role that community-based organizations could be called upon to play in the overall education efforts that support Latino/Hispanic children in the United States today. He required that we move beyond seeing community-based after-school centers as "havens of safety and recreation" to creating and building institutions with the ability to reach and teach Latino children and their families. Raul envisioned "Academias" that would engage parents, public schools and community advocates in dialogue towards the development of joint ventures and partnerships for a stronger and more holistic education network that would support all children. With the generous support of the Carnegie Foundation and the talent and perseverance of then Center for Community Educational Excellence (C^2E^2) director, Lori S. Orum, the academically-rigorous, community-based *Academia del Pueblo* ideas became a reality. From there, the Project EXCEL initiative expanded from the elementary school *Academia del Pueblo* to include Project Success for middle and junior high school age students and *Academia del Pueblo-Math And Science* (ADP-MAS).

During the development of the Project EXCEL curricula, the contributions and hard work of field-based educators took center stage. Their willingness to spend countless hours on reviews and retesting of material greatly enhanced the original documents, making them more user-friendly and culturally and linguistically appropriate. We wish also to acknowledge the NCLR affiliates, community-based organizations, and the hundreds of children and families who piloted the curricula and permitted NCLR staff to engage in ongoing reviews of their work, successes and challenges. Among these field-based educators and their organizations we gratefully acknowledge: Gilbert Guerrero, Guadalupe Center, Inc., Kansas City, Missouri; Derbert Plaza and Concepción Chaverria, El Hogar del Niño, Chicago, Illinois; Ramona Rosales, Martha Moran and Tracy Cerda of the Hispanic Pre-College Project, University of St. Thomas, St. Paul, Minnesota; Mike Ferrer and Nitza Gonzalez of the Centro de Servicios Sociales, Lorain, Ohio; and Monica Incerti of Centro Latino de San Francisco, San Francisco, California.

We are indebted to the many NCLR Center for Community Educational Excellence staff, who over several years, have contributed to the publication of Project EXCEL's Academia del Pueblo-MAS curriculum, especially Fidel Vargas, former Education Specialist and Consultant to Project EXCEL and Nick A. Vasquez, an experienced bilingual fifth and sixth grade teacher and Consultant to Project EXCEL, who, along with Lori Orum, developed the original pilot materials. Beatriz Acosta and Rosa Maria Valdés, assisted with translation; and Dannette Molina provided the original desktop publishing assistance. Marisa Saunders, Jose Delgadillo, Jennifer Trochez, Corinne Martínez, Azucena Bonilla, and Sandra Garcia, and Education Director Antonia Lopez, worked closely with the pilot sites to coordinate feedback and comments on the lessons and provide training and technical assistance during the demonstration phase. The completion of the ADP-MAS curriculum would not have been possible without Ariana Quiñones, Alejandra Domenzain, and particularly, Zelma Cosio – with the help of intern Irene Cuyun – for tirelessly grinding out the document though many revisions as well as working on extensive translations of the final draft. We are tremendously indebted to Naomi Ayala, the principal architect of this final curriculum. She has brought to the final phase of this effort invaluable curriculum and cultural expertise, the contribution of the *Nuestro Mundo Creativo* Work Stations and arts activities throughout the text, the creation of the Parent Links that appear in individual lessons, as well as editing of the final manuscript.

Special thanks to Christina Bryan for her thorough editing, Rosemary Aguilar Francis, Ofelia Ardón-Jones, and Magdalena Lezama for the design and layout. We also wish to thank Samuel Miranda for his images, designed especially for ADP-MAS, which brought the pages to life and nourished the document with added creativity. The Center for Community Educational Excellence staff wish to express their appreciation to NCLR Senior Vice President Charles Kamasaki for his resolute spirit and sound advice throughout the process.

NCLR staff benefitted from the EXCEL-MAS advisors and colleagues who provided guidance, resources, training, and advice throughout the development phase. Thanks to George Castro, Patricia Chávez, Beatriz Gonzalez, Ralph Gonzalez, Dr. Ana Sol Gutierrez, Dr. David Heil, Luis Mata, Dr. Jack Alexander McKay, Dr. Jeannie Oakes, Estrella M. Triana, and Dr. Michael Webb. Drs. Leo F. Estrada, Patricia Gándara, Joan Herman, David Ramirez, and Richard Verdugo provided assistance with development of and revisions to the evaluation design. Thanks also to our National Science Foundation Program Officers, Drs. Roger Mitchell and James R. Ogelsby.

We must acknowledge the organizations whose materials and expertise provided a foundation from which to build the curriculum: Lawrence Hall of Science's Great Explorations in Math and Science (GEMS), the American Chemical Society's WonderScience, the National Science Foundation's National Science and Technology Week materials, and the American Association for the Advancement of Science's Challenge of the Unknown. The cooperative learning structures used in these lessons are generally those developed by Dr. Spencer Kagan and his associates at Kagan Cooperative Learning.

Of course none of this would have been possible without the support of the various foundations and corporations who recognized the importance of this initiative. The Carnegie Corporation of New York was Project EXCEL's original and principal supporter. Funding for the development of the math and science materials was primarily provided by the National Science Foundation. We also wish to thank the AT&T Foundation, the BP Amoco Corporation, Pew Charitable Trusts, the Coca-Cola Foundation, Ronald McDonald's Children's Charities, and J.C. Penney for their support of Project EXCEL and the Center for Community Educational Excellence. Thanks to State Farm Insurance Company who made this printing possible.

Introduction
History and Background

This curriculum, Academia del Pueblo - Math and Science (ADP-MAS) is an outgrowth of the National Council of La Raza's Project EXCEL, a supplemental, educational enrichment model for at-risk Latino students to be operated by Latino community-based organizations, or public institutions, including schools with substantial Latino student populations. ADP-MAS aims to increase and strengthen informal math and science opportunities for Latino students by building on the lessons learned through the Project EXCEL experience.

Project EXCEL begins with an instructional philosophy offering activities for students that:

(1) provide enrichment rather than remediation, concentrating on higher-order skills;

(2) draw from curriculum areas presented in an integrated thematic manner;

(3) provide students with opportunities to write frequently and for real audiences;

(4) reflect contemporary understandings of effective teaching and learning strategies most productive for Latino students, and draw on the strengths of their families, communities, and cultural values.

Profile of Demonstration Sites

Thirteen organizations participated as demonstration sites for Project EXCEL. Beginning in 1985, Project EXCEL was pilot tested at the Guadalupe Center, Inc. (GCI) in Kansas City, Missouri. GCI was an important partner in the development and design of the model and subsequent materials. In many ways, GCI served as the prototype for which the model was designed - a well-established, neighborhood-based, multi-service agency, serving a low-income and overwhelmingly Latino neighborhood, interested in education and committed to increasing its capacity to offer educational programs, and to engage in educational advocacy.

Most organizations that served as Project EXCEL demonstration sites fit the GCI model. Nine were Latino, community-based, social service organizations in largely similar circumstances, and one was the Latino outreach program of a coalition of churches. Some organizations were more established than others, and the financial capacity of the agencies varied tremendously. Some programs tried to operate on as little as $5,000 per year, while several had annual budgets of more than $200,000. Most programs had annual financial resources ranging from $15,000 to $35,000. Eight of the ten EXCEL programs sponsored by Latino community-based organizations (CBOs) were operated independently. The other two programs were sponsored by the CBOs but were entirely funded by school districts and run collaboratively.

Of the three EXCEL programs not sponsored by Latino CBOs, one was operated by the pre-college program of a private university, one by a Latino research agency, and one by the family support program of a city school district.

There was also diversity among the communities. Sites were located in urban, rural, and small town settings, and in areas of both large and small Latino populations. For example, five were in the West region, four in the Midwest, three in the Northeast/Mid-Atlantic region, and one site in the Southwest.

Demonstration Sites

Centro Latino de San Francisco	San Francisco, CA
Eastmont Community Center	Los Angeles, CA
El Comité Hispano de Virginia	Falls Church, VA
El Hogar del Niño	Chicago, IL
Family Resource Schools	Denver, CO
Friendly House	Phoenix, AZ
Guadalupe Center, Inc.	Kansas City, MO
Hispanic Pre-College Project	St. Paul, MN
La Casa de Amistad	Harrisburg, PA
LARASA (Latin American Research and Service Agency)	Denver, CO
Latino Resource Organization	Santa Monica, CA
United Community Center	Milwaukee, WI
United Community Ministries	Alexandria, VA

Of those pilot sites, several were instrumental in the development of the Academia del Pueblo-MAS curriculum: Centro Latino de San Francisco, Eastmont Community Center, El Hogar del Niño, Family Resource Schools, Friendly House, Guadalupe Center, Inc,. and the Hispanic Pre-College Project.

Demographic Profile of Participants

The populations of the demonstration communities served by the EXCEL sites were overwhelmingly low-income and undereducated. The ethnic sub-group composition of the participants varied by local community, as did the participants' length of residence in the United States, number of family members, and language background. The EXCEL curriculum was designed with the needs of Latino students and families in mind, and most of the participating agencies provide services to a predominantly Latino population. However, non-Latinos have also participated in the programs.

The ethnic background of EXCEL Latino participants has also reflected the makeup of the U.S. Latino populations, with the largest group being Mexican-American. Slightly over half of the participants were Mexican-American (57%); 16% were Puerto Rican, 7% were Central-American, and an additional 8% were a combination of other Latinos. Over a tenth of the participants were non-Latino; almost 9% of participants were African-American, and 3% were Caucasian.

Other interesting demographics included:

☆ Approximately equal numbers of male and female public school students.

☆ While overall attendance data from Parents as Partners projects is limited, available data and reports from program coordinators indicate that the majority of participants in these programs - perhaps three-quarters - were female.

☆ The vast majority of participants were from very low-income families - approximately, two thirds being from families with annual incomes of less than $15,000, and 41% from families with annual incomes of under $10,000.

☆ Each year, approximately half the students were judged by their teachers to have limited proficiency in English, and between 43.2% and 48.8% reported primarily speaking Spanish with their parents at home.

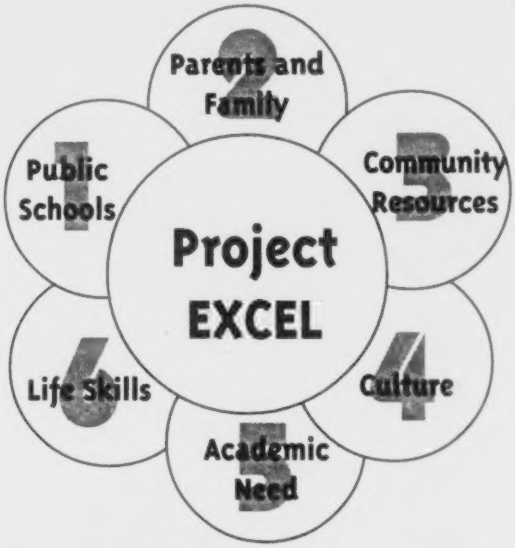
Funders

The Carnegie Corporation of New York was Project EXCEL's original and principal supporter. Funding for the development of the math and science materials was primarily provided by the National Science Foundation. Funding for Project EXCEL training and technical assistance to demonstration sites was provided by a variety of grants from private foundations and corporations, most notably the AT&T Foundation, BP Amoco Foundation, JC Penney, the Pew Charitable Trusts, and Ronald McDonald Childrens' Charities. The Coca-Cola Foundation and Coca-Cola USA provided additional financial support for the evaluation phase. State Farm Insurance Company made this printing possible.

The Project EXCEL Model

The EXCEL model presents an after-school curriculum supported by corresponding facilitation guides designed by the National Council of La Raza and cooperating community-based organizations. The model was developed to be consistent with ten important student entitlements as defined in the book The Good Common School which proposes a philosophy that asks the educator to incorporate into the daily curriculum six arenas that impact the student:

(1) the public school
(2) parents and families
(3) the community and its resources
(4) the culture of the community and home
(5) the academic needs of students, and
(6) life skills



The core that brings together each of the six arenas, is the curriculum. Each arena is discussed briefly in the hopes of presenting the reader with a glimpse at their inter-relatedness and the implications of a successful program and curriculum implementation.

Following is an overview of the model that this philosophy suggests, and information on how the arenas can be integrated into EXCEL in order to provide a holistic program for students.

(1) The Public School

Often, community-based after-school programs see themselves as working in support of the student and in opposition to the public school. This kind of "us versus them" approach can take many forms. Sometimes the community organization sees itself as a place that "teaches the children what they aren't taught in school," providing a place where children can feel safe and loved versus a place where the child may feel alienated and rejected, a place where the child is heard and understood versus a place where the child is ignored and unvalued, or a place where culture and community is celebrated as opposed to a place where culture is set aside or marginalized. The goal of EXCEL is to create a bridge between the two "sides" by working to create common ground.

This does not mean that EXCEL should not be used to advocate for educational reforms within the local schools. It means that educational reform activities can be seen as a way to support the schools in their goals to better serve all students, including Latino and other minority children, by facilitating the use of external community and parent resources. The EXCEL program is called upon to act as a catalyst for dialogue and problem-solving. EXCEL staff initiate contact with the public school to discuss the goals of the program, to enlist their help in recruiting students, to seek support and contact with teachers regarding the academic needs of students, and to seek collaboration for facility and people resources. EXCEL staff are asked to work with their public school counterparts to develop working agreements that support the families and students they will serve together. The Implementation Guide which accompanies this curriculum discusses the relationship that EXCEL and their partners and collaborators in the public schools can work toward.

EXCEL demonstration sites report that, when public school collaboration is not established, the goals for student academic achievement are significantly hampered. The lessons learned are "you can't do it alone," and "you can't replace the public school." Demonstration sites found it useful to form working relationships with public school teachers. In this way, EXCEL lessons could be in sync with, build on, and reinforce public school lessons. EXCEL tutors were better prepared to assist students with homework. Both student improvement and problems in school could be monitored, and collaborative events could be planned such as community improvement campaigns and Latino heritage month celebrations.

(2) Parents and Families[1]

It has become a widely accepted premise that parent involvement is a necessary ingredient to a child's success in school. Latino families face all of the same obstacles that most parents in the United States face today with regard to knowing when, how, and what particular area to become involved with in their child's school. However, in addition to the issues that are common to the typical American parent, Latino parents are often confronted with a whole new array of complex, and often debilitating, issues that stand in the way of their successful engagement with the school. Among these challenges are language barriers that result in inaccessibility to school personnel, school resources, or information regarding policies, programs, practices, and problem-solving alternatives. It is vital to effective parent involvement that communication, both verbal and written, take place in the parent's dominant language. Parent links in the lessons emphasize dialogue with parents, and serve as a way of validating parents' knowledge, language, culture, and experience. They also serve as a way for students to develop pride and awareness of their family histories and strengths.

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[1] In this publication, the word parent is used to refer to the adult who is responsible for caregiving. That person may be a biological, adoptive, or foster parent, a grandparent, relative, or any other individual or individuals who are consistently responsible for the welfare of a child, adolescent, or young adult.

Without the validation of parents, their home culture, and home language, students may dismiss their roots as they learn English and become "Americanized." Often, a culture gap is created between children who are born, or primarily raised in the United States and their parents who immigrated here, especially if the parents are monolingual Spanish-speakers. This culture gap only widens as the child reaches adolescence and the gap is exacerbated by the upheavals typical of this age group. For this reason, EXCEL brings attention to the role of supporting parent and family in educating the student. EXCEL can serve as a bridge instead of a wedge between the parent-child relationship.

Consider the parent who has been educated in another country. Differences in culture, values and philosophy may confuse and confound the parent's ability to understand what is expected of their children, and to discern what is the "proper," or required role for parents in U.S. schools. Latino parents who were educated in this country, but did not complete school successfully, or did not have a stable school experience, may be unable to predict their child's needs based on their own experience. Parents who themselves were "tracked" into non-academic courses may be unable to help their children enroll in college preparatory courses, to help their children with homework, arrange for tutors or special enrichment experiences, or to provide books for them to read for pleasure and/or reference. Latino parents who are underemployed, unemployed, or who work two or three jobs to make ends meet, may not be able to give needed attention to school issues. These parents may go to work before their children get up, and come home late in the evening after everyone should have gone to bed.

Latino parents, their experiences, hopes and aspirations, and the obstacles they face are as diverse as those of the general American society. There are Latino parents who want their children to be high achievers, who push their kids to study hard and "make something of themselves." There are parents who "hope for the best," but don't know what to do to concretely support their children. And, like in other American subgroups, there are too many Latino parents so besieged by the economic and social struggles that merely surviving consumes each waking moment of their day. Each parent (whether s/he is the "bootstrapping" new immigrant, the hopeful but unempowered, or the desperate and destitute) needs to be seen, heard, and supported, first in addressing basic family issues, and then in attending to the needs of the members of the family, including the education of its children.

EXCEL programs report that, in order to support the individual student's academic achievement, program staff has to address the social service needs of the family. The Parents as Partners meetings were incorporated to provide a regular, organized vehicle to help parents learn about important community resources as well as to keep parents informed about school-related issues. Parents as Partners meetings can provide information about everything from where to find food banks, to how to sign up for free computer classes. The meetings can offer strategies for obtaining social supports that benefit families long-term by helping to minimize the kinds of stresses that result in children's low academic achievement. Establishing links to agencies that can "walk parents through" existing service systems can become a fundamental first step in contributing to the success of children in school.

The *Parents as Partners* meetings also provide opportunities to share and discuss strategies and practical information about how to work with the public schools, how to communicate concerns regarding school policy, practices, or curricula. These meetings can provide a forum for parents to organize self-help groups to address shared concerns. Parents need to know what public school services and policies exist so that they can recognize and avoid typical school pitfalls such as "tracking," inappropriate academic placement, inadequate assessment, or ineffective school-home communication. Parents need to become their children's allies and their local school's partners. Parents can develop local networks of support as they develop their own understanding of the public school system and of their rights and responsibilities as parents. The Parents as Partners meetings (when designed to address the interests and issues of parents, first for family security and stability and then to support successful school engagement) can be very effective vehicles for parent and community involvement.

The *Parents as Partners* Guide which accompanies this curriculum, proposes strategies for involving parents in a variety of activities and on a variety of fronts.

(3) The Community and Its Resources

The EXCEL program should be considered one facet of a larger network of community resources. With that view in mind, the program works to bring in sister resources and services for both the core of the curriculum, and the support system that leads to students' academic success. For example, the curriculum regularly suggests that "local experts" be utilized for presentations, illustrations, and experiences related to the key concepts of a lesson.

EXCEL staff may seek to tap into other community resources to supplement the program ("food banks" for the daily snacks, newspaper companies for paper products, and libraries for magazines and books for the "literature links"). With respect to referrals for families and individual students, EXCEL programs rely heavily on a site's relationships with community organizations. EXCEL teachers are encouraged to look for community and cultural events as well as identify issues and create connections to curriculum activities and student projects.

EXCEL programs in demonstration sites also looked to the larger community, to public agencies, and private sector businesses, to provide financial support for the implementation of the programs. Through writing modest proposals to corporate friends in their city or region, some demonstration sites were able to substantially enhance and increase the services they offered the students and families they served.

(4) The Culture of the Community and Home

Throughout the EXCEL program, teachers are encouraged to look for opportunities to "link" learning objectives to culturally familiar activities, events, persons, or values. They are asked to consider how the new ideas they are presenting fit into the cultural world of the student, home, and community. Discussions about culture can provide opportunities for students to share their knowledge and experience, and to feel that they have something to contribute to the class. Suggested Parent Links support two goals: (1) to give students and their parents a familiar ground from which they can continue to develop the concepts from the lesson, and (2) to provide positive reinforcement of the child and the family's cultural heritage. Suggestions for Parent Links are included in each lesson. These links place a strong emphasis on sharing school activities, and or asking family members to contribute information, and their own experiences, to their children's work. They help identify issues and problem-solving techniques, and clarify rights and responsibilities.

(5) The Academic Needs of Students

Because of concern about the high rate of in-grade retention for Latinos, EXCEL works with middle and junior high students to: (1) help develop or reinforce reading and writing skills that are necessary for grade-level achievement, (2) help build good study habits, and (3) promote parent-school communication to help prevent grade-level retention. The model builds in time for students to engage in tutoring or other learning activities.

To create a credible and effective academic and tutorial program, EXCEL teachers must take the initiative to establish and maintain regular contact with their students' public school teachers. If this communication is not established, the EXCEL teacher is working "blind." EXCEL teachers may find that students often report they "have no homework today" or that they have "already done it at school." Later on, however, the parent or student may lament poor grades and unfavorable teacher assessments based on incomplete homework.

To be effective student advocates, and to ensure that students are benefiting from tutorials that reinforce good study habits, EXCEL teachers must take steps to obtain accurate information directly from public school teachers. It is not intended for the EXCEL teacher to replace parents or to assume their role in regard to students' school work. Rather, EXCEL teachers need to work with public school teachers and parents to support the development of students' study skills. EXCEL programs often forge bridges of communication between the public school and the parents. Staff passes along information about parent-teacher conferences, posts information about school activities, reminds parents about test-taking schedules and grade- reporting periods, and generally encourages parents to establish direct links to schools. Through the Parents as Partners meetings, EXCEL facilitates activities that help foster the interaction between parents and public school staff (teachers, counselors, nurses and administrators) so that parents are empowered to initiate their own relationships with the school.

(6) Life Skills: The reality of day-to-day living

EXCEL demonstration sites have learned that sometimes things happen to a student, a family, or a community, that cause their "world to stop." EXCEL students sometimes walk into the classroom carrying with them the aftermath of violence or death. A crisis in the neighborhood or community can destabilize the social order of a child's life. Sometimes the world stops for one child, sometimes for a whole community. It is hoped that EXCEL staff make use of these realities by creating opportunities to talk and learn about life skills (how to negotiate problems, how to avoid violent confrontations, how to behave under stress, how to obtain help for oneself and others, how to foresee and address conflict, and, ultimately, how to prevent it from recurring.

Learning life skills through an examination of real-life adversity is empowering. It teaches a child that regardless of his/her circumstances, s/he is not a victim. Students and their families can take steps towards regaining control of their lives and, by working with others in similar circumstances they can bring about change in their communities. EXCEL teachers need to trust themselves as well, knowing when to "stop the world," who to bring in to help sort it out again, and how to take advantage of opportunities to develop "life skills" as an integral part of the curriculum.

The ADP-MAS Curriculum

The *Academia del Pueblo-Math and Science Curriculum (ADP-MAS)* curricula has a strong, arts- infused, informal math and science focus. The topics, timely and sometimes controversial, invite students to grapple analytically with current environmental problems, and stress the connection between school and everyday science and mathematics. Students who are not high achievers in the traditional sense can and do succeed as they work in small groups and in a cooperative format.

This curricula promotes the: 1) development of citizenship; 2) prevention of delinquency; 3) growth of student interest in social studies; and 4) understanding of education and career opportunities. During the program, students will develop and produce several newsletters, write to public officials regarding local concerns, exchange information with their parents, and propose and analyze action plans on issues of importance to their community.

Every unit includes Spanish translations of both unit and each lesson overviews, key skills, essential instructional vocabulary for some key activities, including Work Stations, Parent Links, and the Parent and Parents as Partners Links. Translations are provided in order to give the teacher additional tools for concept development, learning activities, group discussions, or reinforcing explanations to Spanish-dominant students. Because there are so many regional variations of Spanish usage, translations feature Spanish common for everyday use. Puerto Rican, Nicaraguan, and Mexican students will often have different expressions for the same thing. When this happens, teachers are encouraged to incorporate opportunities to talk about the richness and diversity of language and cultures in different Spanish-speaking countries.

The Curriculum Components

The following are eight basic components of the ADP-MAS curriculum:

1. ADP-MAS is based on the philosophy that with a challenging curriculum, all students can succeed academically in school if given proper assistance and instruction.
2. The program focuses on improving the academic skills of Latino students, their self- confidence as learners, their ability to learn new material, and affirms their academic potential with their parents and school teachers.
3. The core curriculum incorporates time for homework assistance or other learning options.
4. Another component, Parents as Partners, helps Latino parents increase their ability to help their children learn while improving their confidence and skills in interacting with school systems, and raising their expectations and/or aspirations for themselves and their community.
5. In order to provide a tutorial safety net, all EXCEL programs develop cooperative agreements with the public school students attend, and establishes regular and ongoing communication between the EXCEL teacher and the collaborating public school teacher.

6. The model was designed for elementary school aged students who may be experiencing difficulty in school as indicated by: low reading ability, limited proficiency in math, science or English, above average rates of absenteeism or disciplinary problems, low test scores, previous incidence of retention and/or other factors identified as contributing "risks" in a particular community.
7. The program is staffed by individuals (paid or volunteer) who can provide instruction to students and parents in whichever language they are best able to learn.
8. The model encourages the use of Latino high school and college student tutors or teaching assistants (paid or volunteer) to provide positive role models for younger students, and to provide these high school and college students with a cross-age tutoring experience.

The Curriculum Focus

The EXCEL model purposely groups students heterogeneously. It makes use of cooperative learning techniques consistent with culturally appropriate learning approaches. It is important that teachers assess the language needs of both students and families. Are there Spanish-monolingual, or Spanish-dominant students in the class? Spanish dominant students may need a considerable amount of instruction in Spanish, as well as Spanish worksheets and handouts. Do the bilingual English-Spanish students need help with reading and writing skills in either (or both languages), even if they speak both? Will they benefit by expanding their Spanish vocabulary to go beyond social language to academic language? Once the teacher has assessed the academic and language needs of families, he or she can begin to identify the resources within the program (parents of children enrolled, community volunteers, Latino education associations and professional groups, etc.) to address these needs.

Because of the low proportion of professional Latino teachers, the curriculum is designed to be implemented by local, community-based teachers or para-educators. While they may lack formal teacher preparation, these teachers reflect the students' ethnicity, cultural and language background, and share a vision and commitment for their community and the academic success of students. The model encourages the use of Latino high school and college students to serve as tutors and teaching assistants. This experience gives older students another education connection (as a community-based mentor), an "inside view" of career possibilities, and is a new source of support for the often overextended staff of community-based organizations.

Sub-section Explanations

Units

Units begin with a summary of the themes addressed in them. The Academia del Pueblo-Math and Science curriculum consists of 6 units, each having integrated themes. The teacher can spend 4-6 weeks on each unit depending on the number of sessions, the pace s/he keeps, and the added extensions and locally-designed features.

Overview

All Academia units include an overview of the lessons it contains.

Objectives

The unit objectives and lesson overviews have been translated so that they can be shared with parents during Parents as Partners meetings, or sent home with students.

Operating Grade Level

Community-based ADP-MAS programs should encourage enrollment of students who are at least seven years of age. The ADP-MAS curriculum assumes an operating grade level that children below second grade may not be able to meet.

Keep in mind that, within the same ADP-MAS group, students' ages, backgrounds, and school experiences may vary widely and that they may be at different operating grade levels. It is important to review the content of each lesson to see if it is appropriate for the children in your group, and to make adjustments accordingly. Reading the whole unit before presenting it will enable you to focus on which activities will work exactly as they are, and which may need to be modified to meet specific needs. As you begin each lesson, remember to ask yourself where it fits, does not fit, your children, since the makeup of the group may change throughout the year.

If you have younger students you may need to recruit an assistant or volunteer to help with the group. Lessons should consist of concrete experiences, with adults demonstrating how to do things rather than giving abstract verbal directions. Hands-on experiences, manipulatives, artwork, and oral language activities are more appropriate for children K-2 than those based on reading and writing proficiency.

If your group includes Spanish-monolingual or Spanish dominant students, translations are given for the key points of each lesson to help you adapt to their operating grade level in Spanish.

Suggested Quotes

Quotes are an important part of the oral tradition of education in Latin American cultures. The quotes express, in a few words, often colorfully, thoughts about issues and controversies that are part of the contemporary experience of Latinos in the United States. The use of personal quotations, many from among America's best known Latino leaders, helps set the tone for a positive and meaning-filled dialogue among students and with their parents and teachers.

The use of quotes may be helpful in initiating students discussion and setting the tone for the lesson. Do students know of similar quotes from their home country or have they heard a parent or family member use one like this? You may ask students to copy the quote into their journals and take it home to discuss with their parents. Using a proverb or personal quotation that everyone can relate to can help to set the tone for a positive and respectful dialogue with parents or elders who may not respond as readily to academic language.

Cultural Link

Suggestions for cultural links are included in each unit to emphasize that children's learning occurs in the context of family and community. As you work through the lessons, we urge you to look for your own opportunities to "link" the learning objectives to culturally familiar activities, events, persons or values. When you plan your schedule for implementing the unit, think about the ideas that you will be presenting and how they might fit into the cultural world and community reality of the children. When children can relate what they are learning in school to their families' experience, both context, school and family are strengthened and reinforce the value of the other.

The suggested cultural links have three purposes: (1) to give students and their parents a familiar ground from which they can continue to develop the ideas (and academic concepts) from the lessons, (2) to positively reinforce their families' cultural heritage, and (3) to create a bridge across cultures which both communities can use for creating mutual confianza (trust) and respect.

The suggestions for cultural links related to each unit may inspire other ideas that are especially relevant to the cultural group or groups represented in each classroom. Some cultural link ideas may be naturally related to the parent links, as when children are encouraged to share activities or get information from family members. Others are cultural extensions of lesson activities. Feel free to use them, perhaps even in a cultural work station, especially with younger children.

Parent Link and Parents as Partners (PAP) Link

Parent involvement is a critical component of the curriculum. Parent Links are included in each unit and in each lesson to reinforce the need to make a connection between what is learned in the classroom and life experiences. The result takes the form of a mutual exchange of ideas, and knowledge that grows out of the curriculum and serves as a bridge to the everyday events that occur within the context of the family. Listening to, sharing with, talking with, writing to, and reading with parents are lifelong activities upon which understanding, mutual respect, and trust are built.

You will notice that the link in each of the unit's "Parents as Partners" focuses on the relationship between de ADP-MAS teacher and the parent, while the parent link in each of the lessons focuses on the relationship between the child and the parent. We encourage teachers and parent coordinators to search out community resources and materials that may be relevant and helpful to parents in your community for distribution at the monthly parent meetings. For example, you might provide parents with information about community-based organizations in your area offering ESL or citizenship classes, legal services, day care, etc. There is a saying, "when you teach a child, you help a child, but when you teach a parent, you help an entire family!"

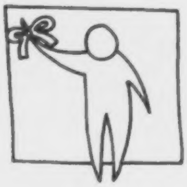
Lesson Format

Overview

Each lesson begins with an overview providing the teacher with a summary of what will be discussed in the lesson.

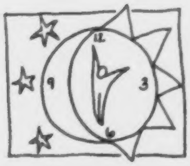
Key Skills

Teachers, parents, and coordinators find it useful to identify the skills activities are designed to develop.



Preplanning

This section alerts the teacher to materials, resource people, or activities that may need to be prepared prior to the lesson. Preplanning sheets are included in Appendix A.



Suggested Time

The time varies from program to program, depending on how often and how long it meets. Typically, after-school programs have 3-hour sessions which include a snack upon arrival, a 45-minute tutorial or homework time, and the lesson activities. Time frames are provided to give the instructor an estimate of the time needed to conduct the activities in the lesson.

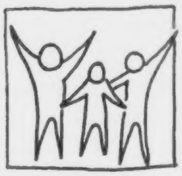
Suggested Quote

The quote selected for the unit appears in the corresponding lessons.

Materials

Each lesson includes a list of materials or supplies that are needed.

Within the Lessons are Session Plans. Each session plan contains the following steps needed to present the lesson:

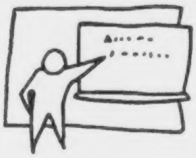


Welcoming

This step sets the stage for the lesson. Introductions take place, and students are given an overview of the lesson.

Homework/Learning Options

The EXCEL model recommends reserving approximately 45 minutes for students to complete homework or other learning activities. Teachers may elect to do this before or after the lesson has been completed.



Curriculum

This is a step-by-step plan of how the lesson should be presented. Some sections, and most handouts, have been translated to assist teachers who need specific Spanish vocabulary for conducting discussions or reviewing content.

Closing

This is an important step of the lesson. Teachers must find time to "bring the lesson together" and to thank students for their participation.

Parent Link

Parent Links are written to encourage communication, interaction, and understanding between students and their parents. Parental support is an invaluable asset that every learner deserves and needs. When adults and children learn from one another, have fun together, and enjoy each other's company, the basic ingredients are present for creating a positive attitude toward a lifetime of learning and mutual respect.

Parents who show their interest and support by listening to their children talk about everyday events are encouraging their children's acquisition of language skills. However, it is especially important for monolingual Spanish-speaking families to, as their child learns English, have communication in Spanish continue so as not to create a wedge between parent and child. The value of being bilingual should be stressed over student's possible desire to give up Spanish in order to assimilate or fit in. An exchange of ideas, experiences, and feelings brings children and parents closer together and often leads to increased understanding.

If Parent Links are to achieve the goal of increased communication, EXCEL staff are strongly encouraged to openly recognize and approve of the connections that students make between their families and the program. Throughout the lessons, as students share a story, family photo, or any other memorabilia, the teacher can empower students by posting on the bulletin board student names and some identifying representation of what was shared. Consider selecting a "Parent Link of the Month" as a way to recognize student contributions. When parents attend the monthly Parents as Partners meeting, the teacher should be sure to acknowledge the student contributions that are posted.

In addition, ADP-MAS lessons may also contain the following sections:

Journals

Journal activities provide students with an added opportunity to reflect on their learning and to review ideas and concepts presented in lessons.

Extension Activities

This section contains recommendations for additional activities or extensions into other related curriculum areas.

Literature Links

Suggestions are offered for linking lesson content to books, publications, videos, or movies. The factual knowledge gained from a lesson is often brought home more vividly through a story or poem. Reading in both English and Spanish is encouraged as a pleasurable recreation, not just as an academic skill.

Finally, as you approach this curriculum, remember the old African proverb, "It takes a whole village to raise a child." The information and ideas provided in this curriculum should be seen as contributing to the foundation for your program. Links will continue to be created as the program begins to grow. Have a great year!

Unit 1

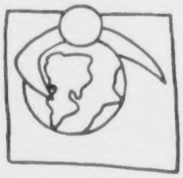
Introduction to Academia
Introducción a la Academia

Introduction

This first unit serves as an orientation to the Academia del Pueblo program, helping students to get acquainted with one another. Students are informed about the expectations of Academia as well as its rights and rules. They are also introduced to cooperative learning groups, journal writing, and guided discussion procedures which are regular instructional features. Time is also allowed for students to complete pre-program interviews or questionnaires for program evaluation. (Please refer to the Implementation Guide.) Also, students are introduced to the concept and essential elements of an experiment, and acquire the basic vocabulary used by scientists conducting experiments. Finally, they are introduced to routine data-collecting activities that will continue through Units 2 and 3.

Introducción

Esta primera unidad sirve como orientación al programa de la Academia del Pueblo, ayudando a los alumnos a conocerse entre sí. Se les informa acerca de las expectativas, las reglas y los derechos de la Academia. Se familiarizan con aspectos básicos del programa, como el aprendizaje cooperativo, la redacción de diarios y el diálogo dirigido. Se provee tiempo para que los alumnos completen las entrevistas pre-programa o los cuestionarios de evaluación del programa. Se les presenta el concepto de un experimento, sus elementos esenciales y el vocabulario básico que usan los científicos al hacer experimentos. Finalmente, se les presentan actividades de recopilación de datos que continuarán en las Unidades 2 y 3.



Overview

Lesson 1: The Individual

This lesson is designed to acquaint students with the Academia staff and their fellow students. The students are also informed about Academia beliefs and expectations, and are introduced to the guided discussion and journal writing formats used in many lessons. Through various "Getting Acquainted" games, this lesson establishes the fun, positive, and comfortable setting of Academia.

Lesson 2: Rights and Rules

This lesson reinforces the concept of respect for individuality, and for people's rights. Students learn about reaching consensus and establish the ground rules for the Academia program. They also become familiar with cooperative learning groups and the work station feature of Academia.

Lesson 3: The Group

Students continue to get acquainted with one another and begin to explore how scientists think when they look at and study the world around them. They also produce writing which can be used for evaluation and assessment purposes.

Lesson 4: The Students' World

In this lesson, students will continue getting acquainted with each other by playing a question game to help them develop interviewing, listening, and public presentation skills. They also learn how to reach consensus and work as a team.

Lesson 5: What is Data?

In this lesson, students are introduced to data collection. Working in their newly-formed cooperative learning groups, students explore the various ways in which information can be recorded and charted. They begin to keep records of daily attendance and the weather, which they chart on a daily basis throughout the following two lessons.

Lesson 6: Experimentation: The Roller Derby (Part I)

This activity introduces the concept of "an experiment." Students are introduced to the world of scientists by conducting their own experiment. They predict the rolling speeds of large and small cans, and set up a fair test to check the accuracy of their predictions.

Lesson 7: Experimentation: The Roller Derby (Part II)

This lesson is designed to reinforce students' familiarity with the concept and vocabulary of an experiment and to give them first-hand experience in interpreting results. It concludes with a review of the key vocabulary terms which have been introduced in Unit 1.

Resumen

Lección 1: La persona individual

Esta lección está diseñada para que los alumnos conozcan al personal de la Academia y a sus compañeros. Se les informa sobre las creencias y expectativas de la Academia y se les presentan las técnicas de diálogo dirigido y redacción de diario que se utilizan en muchas lecciones posteriores. Con actividades de juego para que los alumnos se conozcan entre sí, esta lección establece el ambiente agradable y positivo de Academia.

Lección 2: Derechos y reglas

Esta lección presenta el concepto de respeto a la individualidad y a los derechos de las personas. Los alumnos aprenden lo que es un consenso y establecen las

reglas de conducta para Academia. También se familiarizan con los equipos de aprendizaje cooperativo y los centros de trabajo.

Lección 3: El grupo

En esta lección los alumnos se siguen conociendo y comienzan a investigar cómo piensan los científicos cuando observan y estudian el mundo que los rodea. También producen ejemplos de redacción que se pueden usar para hacer evaluación y valoración.

Lección 4: El mundo de los alumnos

En esta lección, los alumnos se siguen conociendo al participar en un juego de preguntas que los prepara para las entrevistas pre-programa, desarrollando destrezas de entrevistar, escuchar y hacer presentaciones en público. También aprenden a llegar a un consenso y a trabajar en equipo.

Lección 5: ¿Qué son los datos?

En esta lección se les presenta a los alumnos la recopilación de datos. Trabajando en sus nuevos equipos de aprendizaje cooperativo, los alumnos investigan varias maneras de anotar información y hacer gráficas. Comienzan a llevar registros del clima y de la asistencia diaria en gráficas durante las dos lecciones siguientes.

Lección 6: La experimentación: ¡A rodar! (Parte I)

Esta actividad presenta el concepto de un experimento. Los alumnos entran en el mundo de un científico al hacer su propio experimento. Hacen predicciones acerca de la velocidad con que ruedan las latas grandes y pequeñas y organizan una prueba válida para comprobar si sus predicciones son acertadas.

Lección 7: La experimentación: ¡A rodar! (Parte II)

En esta lección se refuerza el concepto y el vocabulario que se usa en la experimentación, también los alumnos tienen la experiencia práctica de interpretar los resultados. La lección termina con un repaso del vocabulario clave que se ha presentado en la Unidad 1.

Objetives

By the end of the unit, students will be able to:

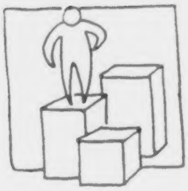
1. Recite the names of the other Academia participants.
2. Realize the uniqueness of themselves and others.
3. Write individual journal entries summarizing things they have learned in a lesson.
4. Reach consensus and prioritize choices.
5. Conduct and respond to an interview.
6. Graph data.
7. Identify the essential elements of an experiment.

8. Understand the importance of conducting a fair test.
9. Correctly define and use the vocabulary introduced in the unit.

Objetivos

Al terminar la unidad, los alumnos serán capaces de:

1. Decir los nombres de los demás alumnos de la Academia.
2. Darse cuenta de la unicidad de sí mismos y de los demás.
3. Redactar en su diario un resumen de lo que han aprendido en una lección.
4. Llegar a un consenso y fijar prioridades entre distintas opciones.
5. Hacer y responder a una entrevista.
6. Hacer gráficas utilizando datos.
7. Identificar los elementos esenciales de un experimento.
8. Comprender la importancia de llevar a cabo una prueba válida.
9. Definir y usar correctamente el vocabulario presentado en esta unidad.

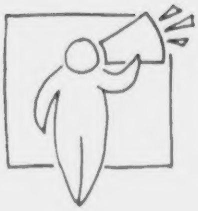


Operating Grade Level

All the lessons in this unit are appropriate for children in grade levels three through five. Use the first few lessons, which focus on interpersonal activities, to get to know the students, their needs, and their capabilities. As you go through the unit, review the content of each lesson to see if it is appropriate for the students in your group, and make the necessary adjustments.

Nivel de grado

Todas las lecciones de esta unidad son apropiadas para niños de tercer a quinto grado. Utilize las primeras lecciones, que están enfocadas en las relaciones entre los alumnos, para conocer a los alumnos, sus necesidades y sus capacidades. A medida que va presentando la unidad, revise el contenido de cada lección para ver si es apropiado para los alumnos del grupo y adapte las actividades conforme a como sea necesario.



Suggested Quote/Cita Sugerida

The following quote, or one of your choosing, may be useful to initiate or continue discussions about ideas that are important in this unit and these lessons.

> *I was raised in what I consider to be not a melting pot, but a salad bowl. The onion stayed the onion, the tomato stayed the tomato, the lettuce stayed the lettuce, with maybe a little Russian or Italian dressing. And it tasted real good. No one lost their identity, and I thought that was what life was like.*
>
> —Edward James Olmos, as quoted in *The Fire in Our Souls*

Mr. Olmos is an actor, producer, and director in the film industry. His career was launched by his starring role in both the stage and screen version of *Zoot Suit*. Since then, he has starred in such films as *Stand and Deliver*, *Blade Runner*, and directed the film, *American Me*.

Yo creci en lo que considero no una olla donde todo se funde, sino más bién un recipiente de ensalada donde la cebolla se mantiene como cebolla, el tomate se mantiene como tomate, la lechuga se mantiene como lechuga, tal vez con un poquito de salsa rusa o italiana. Y esto me supo muy bién. Nadie perdió su identidad y yo pensé que de esa manera era la vida.

—Edward James Olmos

You may want to do the following with the quote:

- ☆ Introduce quote to students.
- ☆ Ask students to write it on newsprint and place it in a visible place such as the wall.
- ☆ Talk about the author.
- ☆ Brainstorm possible meanings and ways in which those meanings apply to the unit and to the lives of students, their families, or their communities.
- ☆ Ask students if the quote reminds them of something their parents, grandparents, or other family members would have said or agreed with.
- ☆ Ask students to re-state the quote in their own words (individually or in a group).
- ☆ Look for opportunities to relate the quote to language arts activities or "Our Creative World" activities in work stations.
- ☆ Create a class "quote file" to which students can add quotes from this curriculum and those that parents, grandparents, or other family members may share with them during the course of Academia.
- ☆ Ask students and adults to send in favorite sayings or proverbs of friends or family members, lyrics from songs, passages from books, or original contributions, that relate to math and science and nature or the environment, or to themes like perseverance, courage, determination, inspiration, identity, uniqueness or diversity.

Usted podría hacer lo siguiente con la cita:

- ☆ Introducir la cita a los alumnos.
- ☆ Pedir a los alumnos que escriban la cita en una hoja de papel grade y que la pongan en un lugar visible como la pared.
- ☆ Disutir posibles significados y formas en las que estos significados se

puedan aplicar a la unidad y la vida de los estudiantes, sus familias o comunidades.

- ☆ Preguntar a los alumnos si esta cita les recuerda a algo que sus padres, abuelos, u otros familiares les hayan dicho o a algo con lo que estarían de acuerdo.
- ☆ Pedir a los alumnos que vuelvan a plantear el mensaje de la cita en sus propias palabras (individualmente o en grupo).
- ☆ Buscar oportunidades para relacionar la cita con las actividades de lenguaje o las actividades de "Nuestro mundo creativo" en los centros de trabajo.
- ☆ Crear un "archivo de citas" de la clase al que los alumnos puedan añadir citas de este manual o citas que sus padres, abuelos u otros miembros de la familia compartan con ellos durante el curso de la Academia.
- ☆ Pedir a los alumnos y personas adultas que manden sus dichos favoritos, proverbios de sus amigos o familiares, letra de canciones, pasajes de libros o contribuciones originales relacionadas a ciencias o matemáticas, la naturaleza o el medio ambiente, o a temas como perseverancia, valentía, determinación, inspiración, identidad, singularidad o diversidad.

Cultural Link

A wonderful facet of being Latino is that we are a blend of many races and nationalities. The Mexican educator José Vasconcelos said that Mexicans are a "Cosmic Race" with lineages that come from all over the world. This can be said of the majority of all Latinos. Our ancestors are a mixture of indigenous Native Americans, Europeans, Africans, and Asians. An interesting and creative learning experience for students would be to have them develop a cultural tree of their nationality. For example, a Puerto Rican student would show a tree with roots that may lead to Arawak Indians, Spain, and Ghana.

Enlace Cultural

Una de las facetas maravillosas de ser latino es que somos una mezcla de muchas razas y nacionalidades. El educador méxicano, José Vasconcelos, dijo que los mexicanos son una "Raza Cósmica" con linajes que vienen de todo el mundo. Esto se puede decir de la mayoría de los latinos. Nuestros ancestros son una mezcla de indígenas nativos americanos, europeos, africanos y asiáticos. Una experiencia interesante de aprendizaje creativo para los estudiantes sería desarrollar un árbol cultural de sus nacionalidades. Por ejemplo, un estudiante puertorriqueño mostraría un árbol con raíces que provienen de los Arawak, de España y Ghana.

Parent Link Summary

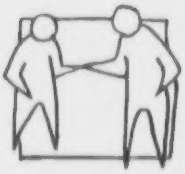
Parent Links attempt to help make meaningful connections between what students learn in school and the world around them. In this unit, students learn about having respect for individuality and for an individual person's rights, about the individual as an important contributor in a large group or community, and about how important her/his uniqueness is because it contributes to diversity. Parent and Cultural Links involve the family in these concepts. Students explore "uniqueness" with their family using some of the skills they've learned in class, like recording data.

Encourage students to write, draw, or talk about what they learned from their parents in the previous lesson's Parent Link during the Daily Homework/ Learning Option. Whenever possible, collect students' writing, drawings, or projects to share at the PAP meetings, to display on a bulletin board at the end of the unit, or to be acknowledged in other ways.

Resumen de enlaces familiares

Los enlaces familiares tratan de ayudar a hacer una conección significativa entre lo que los estudiantes aprenden en la escuela y el mundo que los rodea. En esta unidad, los estudiantes aprenderán acerca del respeto a la individualidad y de los derechos individuales de las personas, el individuo como un contribuyente importante en un grupo grande o una comunidad, y de cúan importante es su singularidad por qué esta contribuye a la diversidad. El enlace familiar y cultural involucra a la familia en discusiones y actividades que exploran estos conceptos. Los estudiantes exploran la "singularidad" con sus familias usando algunas destrezas que aprendieron en clase como la de recopilar datos.

Durante la opción de tarea para la casa, incentive a los estudiantes a escribir, dibujar o hablar sobre lo que aprendieron de sus padres en los enlaces familiares de las lecciones previas. Siempre que sea posible, colecte las redacciones, dibujos o proyectos de los estudiantes para compartir estos en la reunión de padres, para exhibir en el tablero de anuncios al final de la unidad o para que sean reconocidos de otras maneras.



Parents as Partners (PAP) Link

The first parent meeting for the ADP-MAS Parents as Partners component will be an orientation meeting to explain the goals of the program. Parents will be informed of the important role they are asked to assume to make the ADP-MAS program work the most effectively for their child.

Basic points to be covered during the introductory session include:

☆ Formal and informal introductions of ADP-MAS staff and parents.

- A tour of the facility.
- An overview of the goals of ADP-MAS, including the goals for the student, the parent, the agency, and the collaborating school personnel.
- Overview of the curriculum and topics to be covered in ADP-MAS, and method for informing parents about new topics.
- Discussion of program rules and expectations for students, and method for keeping parents informed of student progress (homework, attendance, participation, and successes).
- Discussion of how parents can support their children and the program academically.
- Development of the role parents will play with regard to Parent Links and the Parents as Partners (PAP) meetings.
- Proposed meeting dates for the Parents as Partners meetings.
- Discussion of the role of parents in decision-making with regard to content and the planning of regular PAP meetings.
- Discussion of how parents can participate either as volunteers in the program working directly with students, through the PAP meetings, or in other ways that support the goals of ADP-MAS.
- Discussion of parent involvement in general problem-solving, and the staff person to whom they should direct questions and concerns related to the program.

Please refer to the *Parents as Partners Guide* for ideas and suggestions on the types of activities that might emerge within your own organization and the ADP-MAS program.

Following the initial discussion, the PAP facilitator can begin to explain the first two units of the ADP-MAS curriculum that students will be working on before the next monthly meeting. Parents can be advised that Unit One is designed to introduce students to the ADP-MAS program and help them become acquainted with one another. The facilitator can review the rights and rules of the ADP-MAS program, and discuss the regular instructional features (cooperative learning groups, journal writing, and guided discussion procedures) that are used in the curriculum.

A hands-on learning experience will make the evening lively for the parents and keep them involved. The activity in Unit Two, which deals with the concept of animal behavior, is ideal for this. The ADP-MAS environment can be introduced to parents by using either Lesson 11 in Unit Two, "Breakfast for the Birds," or Lesson 13, "Sensory Signals (Part I)," in that same unit. The introduction of any one of these two popular lessons will involve parents in a high-energy experience, and show them how their children can be excited about the program.

Suggested resources for this meeting are:

- A roster of ADP-MAS staff and their respective responsibilities.
- ADP-MAS goals and objectives.
- Summary of curriculum and list of curriculum topics.
- "Sample PAP meeting agenda." (You can use the one you prepared for this very meeting or copy the one at the end of this unit.)
- A list of ways in which parents can participate in the program as volunteers (working directly with Academia students, helping with PAP meetings, or other ways of supporting the goals of ADP-MAS).
- Program calendar (including holidays, days program is closed, procedures for emergency closings, hours, transportation and program location).
- Description of upcoming unit objectives and Parent Links.
- Handout of Lesson 11 or Lesson 13 from Unit Two.
- PAP Resource 1.2, "Science and Math at Home for Young Children," and PAP Resource 1.3, "Science and Math at Home for Ages Six to Ten."

Before concluding the meeting, let parents know that the ADP-MAS program is also a partner in Project PRISM. Advise parents that Project PRISM can help them get their children excited about science and math. During this part of the meeting, hand out copies of PAP Resource 1.2 and 1.3. This section of the curriculum will help parents focus on developing a strategy to promote math and science in their homes. It will reinforce the meeting's strong underlying intentions that parents are important in establishing environments for their children's academic success.

Reunión de padres

La primera reunión de padres de ADP-MAS es una reunión de orientación para explicar las metas del programa. Los padres van a ser informados sobre el papel importante que asumen de asegurar que el proyecto de ADP-MAS funcione efectivamente para sus hijos. Durante la sesión de introducción se cubrirán los siguientes puntos básicos:

- Introducción formal e informal del personal de ADP-MAS y de los padres.
- Una visita guiada del edificio donde estará localizado el programa.
- Un resumen de las metas de ADP-MAS incluyendo las metas para los estudiantes, los padres, la agencia y para el personal de la escuela que trabaja en colaboración.
- Un resumen de los temas que va a cubrir el programa de ADP-MAS y la forma en que se va a informar a los padres de estos nuevos temas.

- ☆ Reglas del programa, expectativas para los estudiantes y la manera en que se va a mantener informados a los padres sobre el progreso de sus hijos (en cuanto a tareas, asistencia, participación y éxito).
- ☆ De qué forma pueden los padres apoyar a sus hijos y al programa academicamente.
- ☆ Defina el papel que los padres van a desarrollar con referencia a los Enlaces familiares y la reunión de padres.
- ☆ Proponer fechas para las próximas reuniones de padres (PAP)
- ☆ Discutir el papel que los padres van a desempeñar en la toma decisiones con respecto al contenido y la planificación de estas reuniones.
- ☆ Conversar acerca de las formas en que los padres pueden participar como voluntarios (por ejemplo, trabajar directamente con los estudiantes del programa, asistir con la organización de las reuniones de padres u otras actividades que apoyen las metas de ADP-MAS).
- ☆ Cómo pueden los padres participar en la resolución de problemas generales o a qué miembro del personal pueden dirigir sus preguntas y preocupaciones relacionas con el programa.

Por favor refiérase a la *Guía de reuniones para padres* para obtener ideas y sugerencias sobre otros tipos de actividades que podrían surgir dentro de su propia organización y el programa de ADP-MAS.

Después de la conversación inicial, el facilitador de la reunión para padres puede explicar las primeras dos unidades del manual de ADP-MAS y qué cosas los estudiantes van a cubrir en estas unidades antes de la próxima reunión mensual de padres. Se les puede informar sobre la unidad número uno, la cúal está designada a introducir el programa de ADP-MAS a los estudiantes y a ayudarlos a conocerse entre sí. El facilitador puede revisar los derechos y reglas del programa de ADP-MAS y conversar sobre los métodos regulares de instrucción (como grupos de aprendizaje cooperativo, redacción de diarios y los procedimientos del diálogo dirigido) que se usarán en el manual.

Una experiencia práctica de aprendizaje hará la noche más animada y mantendrá involucrados a los padres. La actividad de la unidad dos que trata el concepto del comportamiento animal es ideal para esto. El ambiente de ADP-MAS puede ser introducido a los padres por medio de la Lección 11 de la Unidad 2, titulada "Desayuno para los pájaros", o la Lección 13, titulada "Signos sensoriales (Parte I)" de la misma unidad. Estas dos lecciones involucrarán a los padres en una experiencia bastante energética y les mostrará cómo sus niños pueden entusiasmarse con el programa.

Los recursos sugeridos para esta reunión son:

- ☆ Un listado del personal de ADP-MAS y las responsabilidades de cada cual.
- ☆ Resumen del programa de estudios y de los temas que este cubre.

☆ Un resumen de las metas de ADP-MAS y sus objetivos.
☆ Una copia de la agenda para la reunión de padres. (Puede utilizar la copia que preparó para la reunión de hoy o la que se encuentra al final de esta unidad.)
☆ Una lista acerca de las formas en que los padres pueden participar en el programa como voluntarios (por ejemplo, trabajar directamente con los estudiantes del programa, asistir con la organización de las reuniones de padres u otras actividades que apoyen las metas de ADP-MAS).
☆ Calendario del programa (incluyendo los días feriados, los días en que el programa va a estar cerrado, reglas que se deben seguir en caso de cierre por alguna emergencia, las horas de funcionamiento, el transporte y la dirección donde está localizado el programa).
☆ Descripción de los objetivos y Enlaces familiares de la próxima unidad.
☆ Copias de las Lecciones 11 o 13 de la Unidad 2.
☆ Copias de la Hoja de recursos 1.2, "Las ciencias y las matemáticas en casa para niños pre-escolares" y de la Hoja de recursos 1.3, "Ciencias y matemáticas en casa para niños de seis y diez años".

Antes de concluir la reunión, déjele saber a los padres.que ADP-MAS y el Proyecto PRISM han colaborado en el desarrollo de materiales de ciencia y matemáticas para niños. Las ideas que ofrece el Proyecto PRISM les pueden ayudar a los padres a estimular a sus hijos a poner más empeño para estudiar y aprender ciencias y matemáticas. Durante esta parte de la reunión, distribuya una copia de los materiales (Recursos para reuniones de padres 1.2 y 1.3). Esta sesión del Proyecto PRISM ayudará a los padres a enfocarse en el desarrollo de estrategias para promover las ciencias y las matemáticas en sus casas. Esto le dará a entender a los padres la importancia del papel que ellos pueden tomar en establecer ambientes para que sus hijos tengan éxito académico.

Parents as Partners Resource 1.1

Sample Parents As Partners (PAP) Meeting Agenda

Arrival: Sign-in, distribution of agenda and name tags, refreshments, tour of the classroom, view of student exhibits and displays, social time.

Welcome: Hosts (students, program staff, and parents) welcome and introduce new members (parents, students, staff or volunteers) and give overview of the agenda.

Program Update: Program staff or students present a brief discussion of what students have been engaged in since last PAP meeting: class projects; connections made with guest speakers; community or cultural events; and connections with the public schools.

Parents as Partners Special Feature: Discussion or presentations of special interest to parents that are related to the information that students have been studying. This may be replaced with time set aside for cultural or program celebrations planned as a part of the overall program.

Planning for Student Support: Discussion of the topics for upcoming lessons, how Parent Links will involve parents, any special needs of the program in terms of volunteers, materials, or other help.

Planning for Next PAP Meeting: Confirm next meeting date, discuss and select topics for discussion related to PAP Link, and form a committee to help structure and conduct the next meeting.

Announcements: Special events related to the program or public schools (PTA meetings, parent-teacher conferences, school events, grades, special resources).

Closure and Acknowledgments: Hosts thank all those who attended the meeting, those who made it possible, and those who helped make it successful. Encourage everyone to stay for refreshments and to return for next month's meeting.

Refreshments and Social Time: Students and parents host the closing refreshments.

Recurso para reunión de padres 1.1
Ejemplo de agenda para reunión de padres

Llegada: Firmar lista de asistencia, distribuir agenda y etiquetas con nombres, ofrecer bocadillos, visitar el salón de clases y la exposición de trabajos de alumnos y hacer un momento social.

Bienvenida: Los anfitriones (los alumnos, el personal del programa y los padres) dan la bienvenida, presentan a los nuevos participantes (padres, alumnos, personal o voluntarios) y explican la agenda.

Noticias sobre el programa: El personal del programa, o los alumnos, dirigen una breve discusión sobre lo que los alumnos han hecho desde la última reunión de padres: proyectos en clase, conecciones que han formado con invitados al programa; eventos culturales o de la comunidad a los que han asistido y conecciones con la escuela pública colaboradora.

Sección especial de reunión de padres: Diálogo o presentaciones de interés especial para los padres en relación a la información que han estado estudiando los alumnos. Esto se puede reemplazar con el tiempo dedicado a celebraciones culturales o a las celebraciones que han sido planeadas como parte del programa en general.

Planes para apoyar a los alumnos: Discusión de los temas de las próximas lecciones, cómo involucrarán a los padres los enlaces familiares, cualquier necesidad especial del programa en cuanto a voluntarios, materiales, etc.

Planes para la próxima reunión de padres: Confirmar la fecha de la próxima reunión, comentar y seleccionar temas para discusión relacionados al enlace familiar y formar una comisión que ayude a estructurar y dirigir la próxima reunión.

Anuncios: Discusión de eventos especiales relacionados con el programa o las escuelas públicas (juntas de asociaciones de padres, entrevistas entre padres y maestros, eventos escolares, calificaciones, recursos especiales).

Conclusión y reconocimiento: Los anfitriones le dan las gracias a todos los que asistieron a la reunión, a los que la hicieron posible y a los que ayudaron a que saliera bien. Anime a todos los invitados a que se queden para compartir refrescos y a que vuelvan a la próxima reunión.

Refrigerio y momento social: Los alumnos y los padres sirven de anfitriones al final de la reunión cuando se ofrecen los últimos refrescos.

Parents as Partners Resource 1.2

Project Prism's "Science and Math at Home for Young Children*"

The kinds of games a parent plays with his/her preschool children can influence whether preschoolers want to learn math and science. The questions a parent asks and the toys a parent gives children to play with also play an important role in children's learning.

Children are never too young to become interested in math and science. They are natural scientists and mathematicians: they are curious, ask questions all the time, and like to explore and experiment. When a parent encourages their questions and helps them explore and find out answers, s/he builds their interest in math and science. Children who have such experiences when they are very young enjoy math and science and develop confidence in their ability, something that definitely pays off when they're older. Following is a list of simple things a parent can do to develop a preschool child's interest in science and math:

- ☆ **Go for walks with your child.** Take time to notice what's around you — plants, animals, mosquitoes, dandelions, etc. Stop, look, listen. Talk about what you see. Encourage your child to draw the things you see together on a walk — plants, trees, animals, clouds, favorite places, the house you live in. Afterward, have your child tell you about the drawing. Write down what your child says about the picture. Read it together as a story. And make a book of your child's art and stories.
- ☆ **Listen to your child and ask questions about what s/he is seeing and doing.** Children need time every day to tell another person about what they see, do, and think. When your child tells you what s/he saw on a walk, or what s/he liked best about the trip to the zoo, your child has to think and choose words. Children practice saying aloud what is inside their heads. And they learn that their ideas are important to you.
- ☆ **Choose toys that can help your child learn.** Children learn a lot about the world by playing, and need toys that get them excited about using their imagination and about exploring. The best toys are not usually the latest, most expensive ones advertised on television. They're usually ones that are simple, last a long time, and don't use batteries. Some great toys include the following:
  - **Balls** - Of all kinds and sizes, can be bounced, rolled, thrown in the air, raced across the floor or grass or sidewalk. Which kind bounces highest? Lowest? Which kind sinks in water? Which one floats?
  - **Water** - Let your child experiment with different objects in a dishpan of cool water. Let her/him try sinking and floating balls, soap bars, toy figures, and other household objects. How about putting the "sinkers" in one pile and the "floaters" in another?
  - **Blocks** - You can buy a set of wooden, plastic, or cardboard blocks at the store or use egg cartons, cereal boxes, or wood scraps. For young children, make sure blocks are big enough to handle easily. Have enough of them in various shapes and sizes to build something really interesting. Children who build are learning geometry, even though we don't use that term.

Parents as Partners Resource 1.2 (Cont.)

- **Puzzles** - These help children solve problems. Doing a puzzle means thinking, practicing, and learning shapes, sizes, and colors. Young children need puzzles with a few large pieces. You can also make your own by cutting a magazine picture (that is pasted onto cardboard) into large pieces.

☆ **Plant a garden with your child.** Planting a garden is a great family activity. A garden can be a patch of dirt in the yard or a container on a window sill. Measure the space or container together. Figure out where the plants will get sunlight. Find out how much seeds will cost. Count the seeds. Measure the rows. Watch the plants grow. Pick vegetables. Look for insects. Learn what plants need to be healthy.

☆ **Read to your child**. Read books out loud every day. Look at picture books together. Find alphabet and counting books. Plan a regular time to go to the school library, public library, or "bookmobile." It doesn't matter if you read in English, Spanish, or Armenian. Just develop the habit of reading.

☆ **Monitor TV watching.** Turn off the television and limit how much of it your child views. Too much television takes time away from other acitivities — like playing with blocks or balls, being outdoors, etc. Aside from the less-than-desirable content of some programs, all television watching is "passive." When children watch television their minds are working in passive ways. Playing, reading, and listening to stories stimulate active mental development. Children who do things other than watch television usually do better in science and math. When you do let them watch, choose the shows they watch carefully. Try to find good programs for young children like *Sesame Street* and *3-2-1 Contact*.

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* Excerpted from Project PRISM handout. Project PRISM is a program of the National Urban League, Inc., in association with the National Council of La Raza, The NETWORK, Inc., and Thirteen/WNET; funded by the Annenberg/CPB Math and Science Project.

Recurso para reunión de padres 1.2
"La Ciencia y Matemáticas para Niños Pre-Escolares" del Proyecto PRISM*

Los tipos de juegos que usted juega con sus niños pueden influir su deseo de aprender ciencia y matemática. También les pueden influir las preguntas que usted les hace y los juguetes que les da para jugar.

Los niños nunca son demasiado jóvenes para interesarse en la ciencia y las matemáticas. En realidad, los niños son científicos y matemáticos naturalmente: son curiosos, hacen preguntas todo el tiempo y les gusta explorar y experimentar. Cuando usted los anima a hacer preguntas, los ayuda a explorar y a encontrar respuestas, está incentivando su interés en las matemáticas y la ciencia. Los niños que tienen estas experiencias cuando son jovenes desarrollan interés en las matemáticas y la ciencia y confianza en su habilidad. Las siguientes actividades pueden ayudar a desarollar el interés de un niño pre-escolar en la ciencia y las matemáticas.

☆ **Salga a caminar con su niño/a.** Tome tiempo para observar lo que está a su alrededor — plantas, animales, hormigas, mosquitos, flores, etc. Pare y mire. Platique sobre lo que observan. Dibujen lo que miren cuando salgan a caminar, de sus escalones de enfrente de la casa, en su jardín, o desde su ventana. Pídale a su niño/a que dibuje una planta, un animal, o un lugar favorito y que le hable sobre el dibujo. Escriba lo que el niño/a le diga sobre el dibujo. Léanlo juntos como una historia. Haga un libro de arte y cuentos de su niño.

☆ **Escuche a sus niños y pregúnteles sobre lo que ven y hacen.** Los niños deben tener tiempo para platicar con otra persona sobre lo que han visto o lo que piensan. Cuando su hijo/a le dice lo que vió caminando, o lo que a él/ella le gustó más del paseo al zoológico, esto es lo que ocurre: su niño/a tiene que pensar y elegir palabras. Aprenden los niños a expresar sus ideas en voz alta. También aprenden que sus ideas le son importantes a usted.

☆ **Escoja juguetes que ayuden a los niños a aprender.** Los niños aprenden del mundo através del juego. Ellos necesitan juguetes que ayuden a desarrollar sus imaginación y los animen a explorar — no los últimos ni los objetos más costosos anunciados en la televisión. Los juguetes que necesitan son muchas veces más sencillos, duraderos y no usan baterías. Tampoco tienen que ser costosos. Juguetes maravillosos incluyen:

- **Las Pelotas** - Pelotas de todas clases y tamaños que pueden hacer rebotar, rodar, tirar al aire, o correr por el piso, el sacate, o en la banqueta. ¿Qué tipo de pelota rebota más alto? ¿más bajo? ¿Cuáles se hunden y cuáles flotan en el agua?
- **El Agua** - Deje que los niños experimenten con diferentes objetos en un valde de agua. Deje que su hijo/a trate de hundir o hacer flotar las pelotas, barras de jabón, juguetes y otros objetos. Deje que su niño/a ponga los objetos que se hunden en una pila y los que floten en otra.

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Recurso para reunión de padres 1.2 (Cont.)

- **Los Bloques** - Los bloques para construir son juguetes maravillosos, juguetes de ciencia y matemáticas. Se puede comprar bloques de madera, plástico o cartón en la tienda o usar cartones de huevos, cajas de cereales, o pedazos de madera. Para los niños pequeños, asegúrese que los pedazos sean de un tamaño fácil de manejar, y que tenga bastantes figuras y tamaños para que puedan construir algo realmente interesante. Los niños que construyen, practican geometría, aunque no usemos esta palabra.
- **Los Rompecabezas** - ¡Los rompecabezas ayudan a los niños a resolver problemas! El hacer un rompecabezas significa pensar, practicar, y aprender formas, tamaños y colores. Los niños pequeños necesitan rompecabezas con unos cuantos pedazos grandes. Usted les puede hacer sus propios rompecabezas cortando un retrato de revista en pedazos grandes. Los niños necesitan rompecabezas más complicados a medida que van creciendo. Entre más rompecabezas hagan, más habilidad desarollan.

☆ **Plante un jardín con su hijo/a.** El plantar un jardín, no importa el tamaño, es una actividad maravillosa para la familia. Un jardín puede ser un pedazo de tierra en un patio, o un recipiente en el borde de una ventana. Mida el lugar o el recipiente. Piense donde podrán recibir sol las plantas. Investigue cuanto van a costar las semillas. Cuente las semillas. Mida las hileras. Mire las plantas crecer. Coseche las verduras. Busque insectos. Aprenda lo que necesitan las plantas para estar saludables. ¡Qué cantidad de ciencia y matemáticas hay en un jardín!

☆ **Léale a su hijo/a.** Lea libros en voz alta todos los días. Miren juntos libros ilustrados. Busque libros sobre el alfabeto y para contar. Haga un horario regular para ir a la biblioteca de la escuela, la biblioteca pública, o a una biblioteca ambulante. Los hermanos mayores pueden ser ideales para leer cuentos. Tambíen las tías, los tíos y los abuelos. Ponga a su niño/a a leerle a usted si él/ella quiere — o pídale que le cuente un cuento sobre los dibujos en el libro. ¡No importa si lee en español, inglés, o armenio! Sólo desarrolle la costumbre de leer.

☆ **Supervise el tiempo que ven televisión.** Apague la televisión y limite el tiempo que ven televisión. Ver mucha televisión le roba tiempo a otras actividades — como jugar con bloques o pelotas, jugar afuera, hacer rompecabezas, dibujar o leer libros. Ver televisión puede ser un vicio difícil de romper. Los niños que hacen otras cosas aparte de ver televisión generalmente tienen más éxito en ciencias y matemáticas en la escuela. Cuando los deje ver televisión, escoja cuidadosamente los programas que miran. Trate de buscar buenos programas como *Sesame Street* y *3-2-1 Contact*. Investigue otros buenos programas y mírelos con su hijo/a.

Parents as Partners Resource 1.3

Project Prism's "Science and Math at Home for Ages Six to Ten*"

Most six-to-ten-year-olds are enthusiastic about science and math activities. This is a time when their language, reading, and math skills develop enormously. They get better at using tools (such as pencils and scissors) and materials for exploring or building. Parents can contribute a lot during these years by developing their children's enjoyment of math and science through everyday activities. This helps build a foundation for school and career success.

Here are some ways to encourage interest in science and math when your child is in the first three or four years of school.

- ☆ **Explore questions about the world of science and math together.** Children this age ask a lot of questions. *What keeps a room warm on a cold day or cool on a hot day? Where does the drinking water come from? What part of a lightbulb glows? What happens to mosquitoes in the winter? Can the same drop of water rain on me twice?* Talking to someone allows children to turn their ideas and thinking into language. It helps them choose, use, and practice science and math words. Talking helps them organize their experiences. It's especially helpful for children who use more than one language to practice words and ideas, especially when they are learning something new.
- ☆ **Use the kitchen for science and math exploration. Cooking calls for measuring, timing, and seeing chemical changes.** Take, for example, baking bread with your child. S/he can help you read the recipe, use cups and spoons to measure the water, sugar, and yeast. You can let your child put some yeast in warm water and watch it bubble and notice the smell. You can talk about what you both think makes the dough rise. A child might wonder how full of air bubbles the dough might be and notice how, once the bread is baked, it can't be punched down anymore, how heat from the oven makes more changes.
- ☆ **Choose toys and books that help children learn.** Lots of science and math can be learned through play. Good toys for science and math learning at this age are magnets, dice, magnifying lenses, puzzles, and blocks. Some games are Mastermind, Mr. Super Mind, Othello, and Tangrams. Origami, puzzle books, rocks and minerals books, and science and math activity books make good gifts. Calculators are no longer expensive. With a calculator, children can explore number patterns and do complex math problems that would be too hard to do in their heads. They still need to learn the facts of arithmetic and to estimate, but calculators can make solving math problems "fun."
- ☆ **Read and listen to your child read.** The habit of reading, listening, and discussing enriches all members of a family. There are wonderful science books written for children that adults can learn from and enjoy as well. They can be borrowed from a library, a "bookmobile," or bought as inexpensive paperbacks at bookstores. Everyone can also learn a lot by looking at photographs and illustrations. Children often enjoy magazines such as *3-2-1 Contact*, *Ranger Rick*, *Owl*, *Zillions*, and *WonderScience*.

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Parents as Partners Resource 1.3 (Cont.)

☆ **Encourage hobbies or collections.** Many children this age love to collect things (leaves, rocks, buttons, coins, stamps, and keys). When they organize collections, they use important math and science skills such as observing, sorting, grouping, and describing. If they make a box or case for their collection, they must use skills like planning, measuring, and thinking about the concepts of area and volume.

☆ **Sign up for math or science programs for children this age or for children and adults together.** Many museums and clubs have math and science programs for elementary school children after school, on Saturdays, or during vacations. These programs can be very similar to Academia. How do you find them? Ask at the school office, at the guidance office, your child's teacher, or Academia staff. Ask other parents. Call up museums and other community organizations and ask them if they have such a program, or if they know of an organization that does. The school or public library lists local organizations. Librarians can help you find programs. Find out if there is a Family Science or Family Math program in your community. If there is not, you and a group of parents can get together and start one up yourselves.

☆ **Use playtime with friends as a chance for fun and learning.** When your children have friends over to play, use this everyday event as a time for learning: plan a baking project, take a trip to the zoo, go on a library expedition. Take turns with other parents. Adult supervision is important. Encouragement and enthusiasm from parents and other adults add to children's interest. Adults can lend a hand and make sure explorations and experiments are done safely. Providing a snack adds to the fun.

☆ **Find a plant or an animal your child can care for.** Children this age can take care of a plant or a pet. Learning what a living thing needs to be healthy is a way to think about the health of all plants and animals, including ourselves. Learning to be responsible is an important life skill.

☆ **Monitor TV watching. Limit viewing.** Too much television takes time away from other activities — like cooking, playing games, doing puzzles, and looking at books. Even though it may be a hard habit to break, students who engage constructively in something other than watching TV usually do better in science and math in school. When you do let them watch television, choose carefully the shows they watch. *Wild America, Square One,* and *3-2-1 Contact* are examples of educational television programs for children. Watch these programs, too, and talk about what you have seen together.

Recurso para reunión de padres 1.3

"La Ciencia y Matemáticas para Niños entre las Edades de 6 y 10 Años" del Proyecto PRISM*

Los niños entre las edades de 6 y 10 años se emocionan con las actividades de ciencia y matemáticas. Continúan el interés y la curiosidad que tenían cuando eran pre-escolares. A la misma vez, su sabiduría y sus habilidades crecen. Sus habilidades de lenguaje, lectura, y matemáticas se desarollan enormemente en estos años; y mejoran en el uso de materiales escolares (como lapices y tijeras) y materiales para explorar o construir.

En esta actividad se presentan maneras para incentivar el interés de su hijo/a en la ciencia y la matemática durante los primeros 3 o 4 años de la escuela.

- **Explore preguntas sobre el mundo de la ciencia y matemática juntos.** Los niños de esta edad hacen muchas preguntas. *¿Qué mantiene el cuarto caliente cuando hace frío o frío cuando hace calor? ¿Por qué a un cuarto del apartamento le da la luz del sol en la mañana y a otro la del atardecer? ¿De dónde viene el agua que tomamos? ¿Qué parte del foco (bombilla) alumbra? ¿Cómo nos ayuda la ropa en diferentes climas? ¿Qué les pasa a los mosquitos en el invierno? ¿Me puede caer la misma gota de lluvia dos veces?* Al platicar con alguien, los niños convierten sus ideas y pensamientos en lenguaje; les ayuda a escoger, usar y practicar las palabras de la ciencia y matemática. La conversación ayuda a los niños a organizar sus experiencias. El practicar palabras e ideas ayuda especialmente a los niños a usar más un idioma, especialmente cuando aprenden algo nuevo.
- **Use la cocina para la exploración de la ciencia y la matemática. El cocinar requiere medir, tomar el tiempo y observar cambios químicos.** *Cuando Carlos hizo pan con su mamá, ella le ayudó a leer las instrucciones. El usó tazas de medir para la harina y cucharas para medir el agua, el azúcar, y la levadura. Dejó que la masa se elevara por una hora. El y su mamá platicaron sobre por qué la masa crecía. Pusieron un poco de levadura en un vasó con agua tibia endulsada y miraron como hacía burbujas. También notaron el olor. Pensaron que la masa debería estar llena de burbujas de aire. Una vez que el pan estuvo, no pudieron aplastarlo. El calor del horno hizo más cambios.*
- **Escoja juguetes y libros que pueden ayudar a los niños aprender.** Através del juego se puede aprender mucha ciencia y matemática. El ir a una juguetería para escoger unos regalos puede ser abrumador. Conviene conocer algunos juguetes y juegos buenos que pueden servir para diversión y para el aprendizaje. Algunos buenos juguetes para el aprendizaje de la ciencia y la matemática son imanes, dados, lentes de aumento, rompecabezas, y bloques. Unos juegos son *Mastermind, Mr. Super Mind, Othello,* and *Tangrams.* Origami, libros de rompecabezas, libros de piedras y minerales, y libros de actividades de ciencia y matemática son buenos regalos. Las calculadoras ya no son caras. Con una calculadora, los niños pueden explorar patrones numéricos y pueden resolver problemas complicados de

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Recurso para reunión de padres 1.3 (Cont.)

matemática que serían muy difícil de resolver en su cabeza. De todos modos, es necesario aprender datos de aritmética y como estimar, pero las calculadoras pueden hacer que el resolver problemas de matemáticas sea divertido.

☆ **Léale a su hijo y escuche a su hijo leer.** La costumbre de leer, oir y discutir enriquece a todos los miembros de la familia. Hay libros de ciencia maravillosos escritos para niños de los cuales también los adultos pueden aprender y disfrutar. Los pueden encontrar en una biblioteca, en una biblioteca móvil, o como libros de bolsillo. La gente también puede aprender mucha ciencia y matemática através de una fotografía o una ilustración. Los niños pueden disfrutar revistas como *3-2-1 Contact, Ranger Rick, Owl, Zillions,* y *WonderScience.*

☆ **Anime a los niños a tener pasatiempos y colecciones.** A la mayoría de los niños de esta edad les encanta coleccionar cosas como hojas, piedras, botones, monedas, estampillas y llaves. Cuando organizan las colecciones, ellos usan las habilidades de ciencia y matemática como el observar, clasificar, agrupar y describir. Si hacen un estuche o una caja para sus colecciones, ellos tienen que planear, medir y pensar sobre los conceptos del área y volumen.

☆ **Inscriba a los niños en programas de ciencia y matemática para niños de su edad o para niños y adultos.** Muchos museos y clubs tienen programas de ciencia para niños de primaria después de la escuela, en los sábados o durante las vacaciones. ¿Cómo se encuentran estos programas? Pregunte en la oficina de la escuela, la oficina de consejería, o a la maestra del niño. Pregúntele a otros padres. Hablele a los museos y otras organizaciones de la comunidad. Si estas no tienen un programa, pregúnteles si saben quién lo tiene. La escuela o la biblioteca pública puede tener una lista de organizaciones locales. La biblioteca puede ayudarle a buscar programas. Investigue si hay un programa en su comunidad de Ciencia Familiar o Matemática Familiar. Si no lo hay, a lo mejor un grupo de padres se puede juntar y ayudar a empezar uno.

☆ **Use el tiempo de juego con amigos como una oportunidad de diversión y aprendizaje.** Cuando su niño traiga a amigos para jugar, use este evento diario como tiempo de aprendizaje. Planee un proyecto de hornear; vaya a un paseo al zoológico; vaya en una expedición a la biblioteca. Tome turnos con otros padres. La supervisión adulta es importante. El ánimo y entusiasmo de un adulto agrega al interés del estudiante. Los adultos pueden darle una mano y asegurarse que las exploraciones y experimentos se hagan con precaución. El proveer bocadillos agrega a la diversión.

☆ **Busque una planta o animal que su niño pueda cuidar.** Los niños de esta edad pueden cuidar una p lanta o una mascota. ¡Aprender lo que un ser viviente necesita para estar saludable es una manera de pensar sobre la salud de todas las plantas y animales, incluyendo la nuestra!

☆ **Supervise el tiempo que miran televisión.** Apague la televisión y limite el tiempo que miran televisión. El ver mucha televisión quita tiempo a otras actividades como cocinar, jugar, hacer rompecabezas y leer. Aunque sea una costumbre difícil de romper, los estudiantes que se entretienen en algo constructivo aparte de mirar televisión usualmente tienen mejores resultados en ciencia y matemáticas en la escuela. Cuando los deje ver televisión, escoja cuidadosamente los programas que van a mirar. *Wild America, Square One,* y *3-2-1 Contact* son ejemplos de programas educativos para niños. Mire usted estos programas también. Platique sobre lo que miraron.

Lesson 1

The Individual
La persona individual

Overview

This lesson is designed to acquaint students with the Academia staff and their fellow students. They will also be informed about the beliefs and expectations of Academia, and will be introduced to the guided discussion and journal writing formats which are used in many future lessons. Through the various "Getting Acquainted" games, this lesson should establish the fun, positive, and comfortable setting of Academia.

Resumen

Esta lección está diseñada para que los alumnos conozcan al personal de Academia y a sus compañeros. Se les informa sobre las creencias y expectativas de la Academia y se les presentan las técnicas de diálogo dirigido y redacción de diario que se utilizan en muchas lecciones posteriores. Con actividades de juego para que los alumnos se conozcan entre sí, esta lección establece el ambiente agradable y positivo de Academia.

Key Skills

Listening

Comprehension

Analysis

Journal writing

Destrezas claves

Escuchar

Comprender

Analizar

Redactar un diario

Preplanning

A *teacher* can conduct this lesson alone if necessary. However, it's a good idea to have all teaching assistants and volunteers who will work consistently with the children be present on the first few days so children can become acquainted with staff.

1. Use the drawing in Handout 1.1 to prepare a large puzzle of the globe on butcher paper. You may take the handout to a copy center and have it enlarged, or use an overhead projector to project a larger image onto butcher paper. Cut along the grids to create more than enough puzzle pieces for the expected number of Academia participants. Place puzzle pieces on a flat surface so students can see them easily and choose the piece they prefer.
2. Make a back-drop for the "Our World" puzzle out of butcher paper, construction paper, or tag board. Write "Our World" in big letters. You may create an outline on the paper or board to make solving the puzzle easier for students.
3. Make name tags for all the children and staff.
4. Review the following vocabulary introduced in this lesson. Throughout the curriculum key terms are italicized and indicated with an asterisk in the Overview, Preplanning, and Session Plan sections. Be sure to familiarize yourself with these terms, use them, and define them for students as they are introduced.

unique	***único***
diversity	***diversidad***

Suggested Time

10 minutes — Welcoming
45 minutes — Homework/Learning Options
20 minutes — Getting Acquainted Games
10 minutes — Guided Discussion
25 minutes — Journal
10 minutes — Closing

2 hours total

Materials

- A journal for each child. (This will serve as the child's journal for the rest of the year.)
- Pencils, pens, and crayons.
- A version of "Goldilocks and the Three Bears."
- Handout 1.1.

- Newsprint.
- Tagboard or cardboard.
- Glue.
- Scissors.

Suggested Quote/Cita Sugerida

I was raised in what I consider to be not a melting pot, but a salad bowl. The onion stayed the onion, the tomato stayed the tomato, the lettuce stayed the lettuce, with maybe a little Russian or Italian dressing. And it tasted real good. No one lost their identity, and I thought that was what life was like.

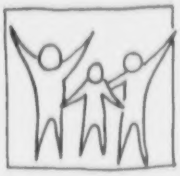
—Edward James Olmos, as quoted in *The Fire in Our Souls*

Mr. Olmos is an actor, producer, and director in the film industry. His career was launched by his starring role in both the stage and screen version of *Zoot Suit*. Since then, he has starred in such films as *Stand and Deliver* and *Blade Runner*, directed the film *American Me*.

Yo crecí en lo que considero no una olla donde todo se funde, sino más bién un recipiente de ensalada donde la cebolla se mantiene como cebolla, el tomate se mantiene como tomate, la lechuga se mantiene como lechuga, tal vez con un poquito de salsa rusa o italiana. Y esto me supo muy bién. Nadie perdió su identidad y yo pensé que de esa manera era la vida.

—Edward James Olmos

SESSION PLAN



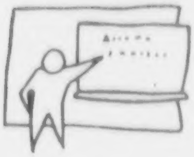
Welcoming (10 minutes)

Give each child a name tag with his or her name written on it. At this time, allow children to choose a puzzle piece and begin decorating the piece they have chosen with their name and images of "nature."

Make sure that each child present and all program staff and volunteers are introduced. While students are decorating their puzzle pieces let them know you look forward to working with them. After they have finished, briefly explain the Academia program. Discuss the Academia mission and any non-negotiable rules. Make sure students are paying attention as you address these important issues.

Homework/Learning Options (45 minutes)

Students should use this time to complete any homework assignments or to receive individualized tutoring. Consider setting up a reading area for those students without homework, or an area to work on math and science problems or puzzles while other students complete their homework.



Curriculum

Getting Acquainted Games (20 minutes)

The Name Game: Begin this session by using a game which will allow each student to learn the names of all the Academia participants and staff. Everyone sits in a circle. You can be the starting point. Say your name and then name a food that you like which starts with the first letter of your name.

Example: "My name is Maria and I like mangos."

The next person must repeat the name of the person before them, their favorite food, and then say their own name and a food they like.

Example: "Your name is Maria and you like mangos. My name is Tomas and I like tortillas."

El juego de los nombres

Dígale, "siéntense en un círculo y tomen turnos diciendo su nombre y una comida que les gusta que empiece con la misma letra que su nombre. Cada persona debe repetir lo que digeron los demas antes de decir su nombre y comida. Tú te llamas María y te gustan los mangos. Yo me llamo Tomás y me gustan las tortillas."

The game gets more difficult as each succeeding child repeats the names and favorite foods of the persons before them as well as their own name and favorite food. If students have trouble remembering names, or if your group is large, allow students to take notes.

"Our World" Puzzle:

The second game can be done in the middle part of the circle area. In the middle of the circle, place the back-drop of the "Our World" puzzle you have prepared. Give students a limited amount of time (5-10 minutes) to put the pieces of the world together.

Tell students:

"Try to put the puzzle together by looking for the missing pieces that the other students have. You have five minutes to do this!"

Rompecabezas "Nuestro Mundo"

Cada alumno y miembro del personal escoge un pedazo de un rompecabezas y lo decoran con sus nombres e imágenes de la naturaleza. Pídale a los estudiantes que traten de armar el rompecabezas buscando entre los demás estudiantes las piezas que faltan. Tienen cinco minutos para hacerlo.

Rationale...

The puzzle activity focuses on the importance of each student in the Academia. It should create the understanding that each person's contribution to the class, and to the cooperative learning teams that will form in the next lesson, is critical. Furthermore, this activity introduces the idea that we can all learn from one another.

Razón fundamental...

La actividad del rompecabezas demuestra la importancia de cada alumno en la Academia. Debe enseñar lo esencial que es la contribución de cada persona a la clase y a los equipos de aprendizaje cooperativo que se formarán en la siguiente lección. Además, esta actividad presenta la idea de que todos podemos aprender de los demás.

Guided Discussion (10 minutes)

Gather students together around the puzzle and ask them if they enjoyed the getting-to-know-you activities. The purpose of this discussion is to get them to realize how unique they all are, but at the same time, how much they are parts of a great whole — our world!

Ask the students:

"Did you like the puzzle activity? Why or why not? Why did you pick that particular piece of the puzzle?"

Pregunte a los alumnos:

"¿Les gustó la actividad del rompecabezas? ¿Porqué o porqué no? ¿Porqué escogiste esa pieza en especial?"

Make the point that even for a simple thing like picking a piece of a jigsaw puzzle, each person has his or her own particular preference. This makes them ***unique**. Just as when they are developing as young people, they all have a different physical and personality makeup. No one is exactly alike — even though we all have some things in common. And, just as in the puzzle activity, each piece, although different, must join together with all the other pieces to make a meaningful whole. Each person is an important piece of many different puzzles or wholes: their families, classes, sports teams, church groups, school clubs, etc.

End this part of the lesson by talking about each person's right to be different. Ask the students if they would like to live in a world where everyone was the same. Hopefully, the majority, or all of them, will agree that ***diversity** makes life more interesting. Ask if they think it's possible to have an interesting world of different people without respecting everyone's differences. They will undoubtedly come to the conclusion that without respect, it would be hard for different people to live in peace. Have everyone hold hands upward towards the ceiling in a giant circle; say to them, "We are a whole...[break hands]...and we are ***unique** individuals!"

En el círculo gigante

Termine esta parte de la lección hablando sobre el derecho que tiene cada persona a ser diferente. Preguntele a los alumnos si les gustaría vivir en un mundo donde todas las personas fueran iguales. Se espera que la mayoría o todos los alumnos estén de acuerdo con que la diversidad hace la vida mas interesante. Preguntele a los alumnos si piensan que es posible tener un mundo interesante con diferentes tipos de gentes sin respetar las diferencias de cada una de las personas. Indudablemente los alumnos llegarán a la conclusión de que sin respeto las personas diferentes no podrían vivir en paz. Pida a los alumnos que formen un círculo grande con las manos agarradas y levantadas juntas hacia el cielo y dígales que "Todos formamos un entero ... [suelten las manos] y cada persona es única!"

Journal (25 minutes)

Read the story of *Goldilocks and the Three Bears* to the students. [A wonderful version of this classic is available through Dodd, Mead & Co. Publishers. Retold by Jan Brett, this version introduces a scale comparison that provides a nice introduction to the science and math focus of the following lessons. *Goldilocks and the Three Bears* is available in Spanish from Hispanic Books Distributors.]

Ask the students:

"What three things was Goldilocks trying to find out in the house of the three bears?" [The most comfortable chair, the appropriate porridge, and the most comfortable bed.]

Distribute a journal booklet to each student. Have the students open up their journals to the first entry page and write about the following:

1. Name three things Goldilocks wanted to find out.
2. How did Goldilocks find out each thing she wanted to know?
3. What were the final results of each investigation that Goldilocks made?

Pregunte a los alumnos:

"¿Qué tres cosas quería investigar Ricitos de Oro en la casa de los tres osos?" [Cuál era la silla más cómoda, cuál era la mejor avena y cuál era la cama más cómoda].

En su diario, cada alumno debe escribir sobre los siguientes temas:

1. Nombra tres cosas que quería investigar Ricitos de Oro.
2. ¿Qué hizo Ricitós de Oro para investigar cada cosa que quería saber?
3. ¿Cuál fue el resultado final de cada investigación que hizo Ricitos de Oro?

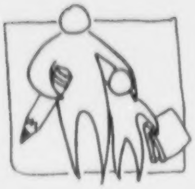
Have two or three students volunteer to read their journal entries to the rest of the class. Tell them that, after each science activity, they will be writing journal entries that will serve as a record of the things they will have done, what they have learned, and any new or unanswered questions they may have. Tell them that this is what scientists do when they do their experiments.

Optional Activity:

Substitute the story of *Goldilocks and the Three Bears* with one of the books listed in the Literature Links section. Continue to explore the issue of ***diversity** and ***uniqueness** among humans through one of these other books. Have students write in their journals about something that makes them unique and different from other people.

Closing (10 minutes)

Display the completed puzzle on the wall of your classroom, if possible. Present the puzzle to the class as a representation of what the group can accomplish together and as a preview of lessons to come. Tell students that alone they only had a piece of the puzzle each but together they were able to create the world. Tell the class that they will be working together a lot and will be focusing on the world... "Our World."



Parent Link

At home, have parents enter into a family discussion on how family members are different. Family members can discuss hairstyles, who wears glasses, hobbies and talents, or different traits. This activity could show the diversity and uniqueness that we have within our own families. How many live with grandparents? Single parents? In blended families?

Enlace familiar

Los padres pueden tener una conversación familiar acerca de las diferencias que existen entre los miembros de la familia, como qué estilo de cabello tienen, quién usa lentes, qué tipo de pasatiempos y talentos tienen, u otras características. Esta actividad puede mostrar la diversidad y la singularidad que tenemos dentro de nuestra propia familia.

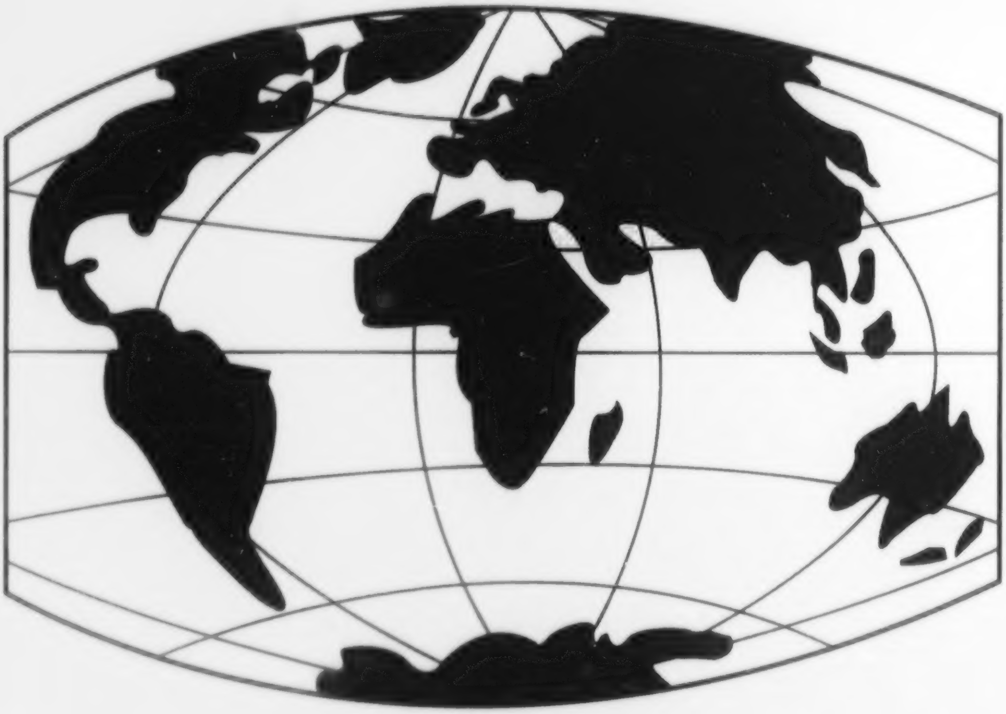
Literature Link

The book *The Adventures of Connie and Diego/Las aventuras de Connie y Diego*, by Maria Garcia, provides a wonderful lesson on diversity and the common bonds among all people. *People*, by Peter Spier, also provides a lesson on diversity. This book celebrates differences in people while appreciating the similarities all humans share. Both are recommended for grades K-5.

The story, "Silver Fox and Coyote Create Earth" is a beautiful Miwok story of creation from Joseph Bruchac's book, *Keepers of the Animals*. Animals are used to demonstrate the value of unity through a journey that culminates in friendship and in "singing the world into being." (Also available on audio cassette.) Recommended for grades K-4.

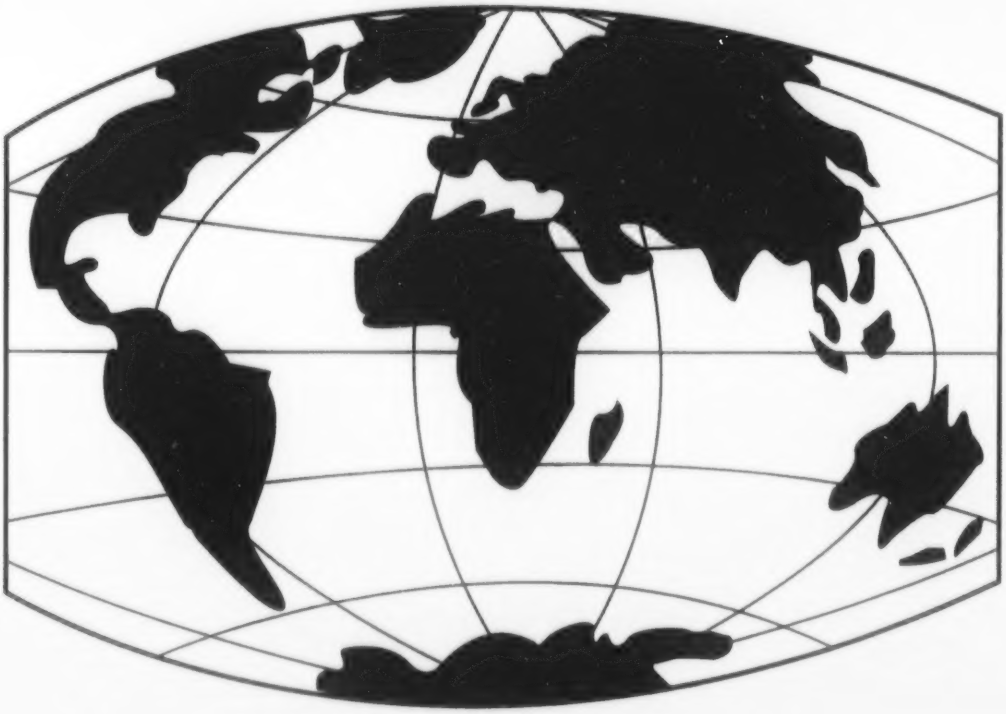
Handout 1.1

"Our World" Puzzle



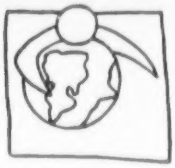
Hoja de trabajo 1.1

Rompecabezas "Nuestro Mundo"



Lesson 2

Rights and Rules
Derechos y Reglas



Overview

This lesson reinforces the concept of respect for individuality, and for people's rights. Students learn about reaching consensus and establish the ground rules for the Academia program. They also become familiar with cooperative learning groups and work stations.

Resumen

Esta lección presenta el concepto del respeto a la individualidad y a los derechos individuales. Los alumnos aprenden lo que es un consenso y establecen las reglas de conducta para la Academia. También se familiarizan con los equipos de aprendizaje cooperativo y los centros de trabajo.

Key Skills

Consensus-building

Prioritizing and combining choices

Working in a group to make choices

Practicing classroom procedures

Thinking creatively

Destrezas claves

Llegar a un consenso

Fijar prioridades y combinar opciones

Trabajar en equipo para elegir entre varias opciones

Practicar procedimientos del aula (salón de clases)

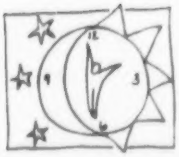
Pensar creativamente

Preplanning

1. Make name tags for students and staff.
2. Prepare an example of a wordbank. (Review implementation manual which describes wordbanks in full, if necessary.)

3. Divide the children into heterogeneous cooperative learning teams. It is important to avoid groups of all one gender, grade level, or language.
4. Identify work station areas in the classroom.
5. Decide what your reward structure will be for good work in cooperative learning teams. Make sure that your rewards don't set up a competitive situation between teams. Choose a structure whereby teams can earn points toward a class prize or treat. For example, teams can earn marbles or beans in a jar for their good work, and when the whole jar is filled, the whole class gets some kind of treat.
6. Review the following terminology:

   **consensus* **consenso*



Suggested Time

5 minutes — Welcoming
45 minutes — Homework/Learning Options
10 minutes — Guided Discussion
10 minutes — Explanation of Work Stations and Practice
40 minutes — Introduction to Work Stations
10 minutes — Closing

2 hours total

Materials

The teacher and two teaching assistants are needed to fully implement this lesson. Materials needed include:

- ☆ Name tags for all students and staff.
- ☆ A timer or bell.
- ☆ Example of a wordbank.
- ☆ Chart/graph paper.
- ☆ Markers.
- ☆ Material about Goldilocks.

Suggested Quote/Cita sugerida

I was raised in what I consider to be not a melting pot, but a salad bowl. The onion stayed the onion, the tomato stayed the tomato, the lettuce stayed the lettuce, with maybe a little Russian or Italian dressing. And it tasted real good. No one lost their identity, and I thought that was what life was like.

—Edward James Olmos, as quoted in *The Fire in Our Soul-*

Mr. Olmos is an actor, producer, and director in the film industry. His career was launched by his starring role in both the stage and screen version of *Zoot Suit*. Since then, he has starred in such films as *Stand and Deliver* and *Blade Runner*, and directed the film *American Me*.

Yo crecí en lo que considero no una olla donde todo se funde, más bién un recipiente de ensalada donde la cebolla se mantiene como cebolla, el tomate se mantiene como tomate, la lechuga se mantiene como lechuga, tal vez con un poquito de salsa rusa o italiana. Y esto me supo muy bién. Nadie perdió su identidad y yo pensé que de esa manera es que era la vida.

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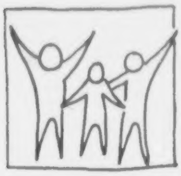
SESSION PLAN

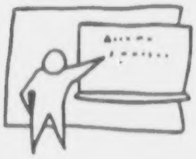


Welcoming (5 minutes)

Students will still be getting acquainted and there may be a few new students arriving for the first time. Use name tags again, review names, re-introduce staff, etc. You may want to play the "Name/Favorite Food" game again, or use another icebreaker.

Homework/Learning Options (45 minutes)

Students should use this time to complete any assignments from school or to receive individualized tutoring.



Curriculum

Guided Discussion (10 minutes)

Ask if any student would like to read his or her journal entry about the adventures of Goldilocks as a review. Ask the following:

"Do you think Goldilocks was being fair to the three bears when she went into their house? Why? Would you like Goldilocks to come to your house? What rights do people have? [Write responses on the board.] What kind of rules do you think we should have here at Academia to make sure everybody's rights are respected?"

Inform students about any non-negotiable rules or philosophies you may have, and then ask them to brainstorm about any rules or standards they would like to adopt. List the possible rules on the chalkboard.

Explain to students how the process of reaching ***consensus** works and that they will be using that process often in this program as they learn to work together. Reaching ***consensus** on ground rules is their first opportunity to practice this skill. Tell students that reaching consensus requires that a group discuss options in a way that allows everyone an opportunity to express their thoughts. A decision should be made as a group.

Examine the rules that students have suggested. Help them reach consensus on what five to ten of the most important rules might be. The students can discuss what rules are the most important and which might be combined. Then write down the final list so that it can be posted later.

Diálogo dirigido

Pregunte a los alumnos:

"¿Piensan que fue justo que Ricitos de Oro entrara a la casa de los tres osos? ¿Porqué? ¿Te gustaría que Ricitos de Oro viniera a tu casa? ¿Qué derechos tiene la gente? ¿Qué tipo de reglas creen que debamos tener aquí en la Academia para asegurar que se respeten los derechos de todos?"

Informe a los estudiantes acerca de las reglas de su clase o su filosofía, luego pídale que piensen en algunas reglas que ellos quisieran adoptar. Escriba en la pizarra la lista de reglas que tienen la posibilidad de ser adoptadas.

Explique a los estudiantes cómo funciona el proceso de alcanzar un ***consenso** y dígale que ellos van a usar éste proceso con frecuencia durante el programa a manera que van aprendiendo a trajabar juntos. La regla de procedimiento es su primera oportunidad de practicar la habilidad de alcanzar un ***consenso**. Diga a los estudiantes que para alcanzar un ***consenso** se requiere que los grupos discutan opciones para que a todos los miembros del grupo se les dé la oportunidad de expresar sus ideas. La decisión se debe tomar por el grupo.

Revise las reglas que los alumnos sugirieron. Ayúdelos a ponerse de acuerdo en decidir a base de grupo cuál de las 5 a 10 reglas son las más importantes. Los estudiantes pueden discutir acerca de qué reglas son las más importantes y cuales se pueden combinar. Una vez que terminen esto escriba la lista final para que luego se pueda exhibir.

Understanding Work Stations and Cooperative Learning Groups

(10 minutes)

Explain to students that they will be dividing into groups and that there are three separate places in the classroom where people will be working in groups. Each group will get a chance to work at each station. You will give them a signal when it's time to change. When they hear or see that signal, they should move quickly and quietly to the next station. Point out where each station is located. Tell students that when they get to each station, the teacher or the teaching assistant will explain the station in more detail. Explain to them what your signal to change work stations will be.

Tell students a little bit about the philosophy of cooperative learning groups — that they should work together, that everyone should participate, that they are to help and encourage their team members, and that for some tasks they will earn points as a team. Explain any reward structure you've established. Your most frequent reward, however, should be praise.

Have students practice moving through the work stations as you give the signal until they do it without excessive noise and confusion. Practice this until they do it satisfactorily, and then thank them for their good efforts.

Comprendiendo los centros de trabajo y los grupos cooperativos de aprendizaje

Explique a los estudiantes que los va a dividir en grupos y que hay tres lugares separados en el salón de clase donde ellos estarán trabajando en grupos. Cada grupo tendrá la oportunidad de trabajar en cada centro de trabajo. Dígale que usted les dará la señal cuando tengan que cambiar de centro. Cuando vean o escuchen la señal, deben moverse silenciosa y rápidamente al próximo centro de trabajo. Señale donde está ubicado cada centro de trabajo. Diga a los estudiantes que cuando lleguen a cada centro de trabajo, el maestro o asistente les va a explicar el propósito del centro con más detalles. Explique a los estudiantes qué señal va a usar para avisarles que tienen que cambiarse de centro de trabajo.

Explique a los estudiantes un poco sobre la filosofía de los grupos cooperativos de aprendizaje: los estudiantes deben trabajar juntos, todos deben participar y deben ayudarse e incentivarse los unos a los otros, y que en ciertos trabajos ellos ganarán puntos como grupo. Explique qué tipo de incentivos ha establecido. La mejor forma de incentivar debe ser un premio.

Deje que los estudiantes practiquen el cambio de centro de trabajo cuando usted dé la señal hasta que ellos lo puedan hacer sin mucho ruido y sin confusión. Practiquen hasta que lo puedan hacer satisfactoriamente y luego déle las gracias por sus buenos esfuerzos.

Introduction to Work Stations (40 minutes; 12-13 minutes at each)

Work Station I: Language Development

A teaching assistant should staff this station, if possible. Students will be using wordbanks or playing games that reinforce and develop vocabulary. The teaching assistant should show the students an example of a wordbank. Tell them that they will have a team wordbank and will store the words they are learning in this bank.

For today, ask the children to identify important words they have learned today and in the last lesson, and write them down as a group. The group needs to decide which words should be included in the team wordbank. If you have extra time, have students brainstorm words, from other reading they have done at home or school, that they feel may also be important to include in their wordbanks.

Centro de trabajo 1: Desarrollo del lenguaje

Si es posible un asistente debe ser el que dirija este centro de trabajo. Los estudiantes deben usar sus bancos de palabras o jugar con los juegos de palabras para reforzar y desarrollar su vocabulario. El asistente debe mostrarle a los

estudiantes un ejemplo de un banco de palabras y decirle que ellos van a tener un banco de palabras de grupo y que van a guardar las palabras que estan aprendiendo en este banco.

Diga a los alumnos que hoy identificarán palabras importantes que aprendieron en esta y la última lección y que las escriban en grupo. El grupo decidirá qué palabras van a ser incluidas en el banco de palabras del grupo. Si tiene tiempo extra, diga a los alumnos que repasen palabras que han leído en otros libros en casa o en la escuela y si ellos piensan que es importante incluirlas en sus bancos de palabras.

Optional Activity:

Team wordbanks are recommended because they enhance cooperation and lend themselves well to games that reinforce and develop vocabulary. However, individual wordbanks are an option and may be more appropriate in groups composed of students possessing a wide range of language skills or proficiency.

Work Station II: Problem-Solving

A teaching assistant should staff this work station where students will work on developing problem-solving skills. Today, they will choose a name for their cooperative learning group using consensus as a tool. If time permits, they can also begin designing a poster or banner for their team.

Centro de trabajo 2: Resolución de problemas

Un asistente debe ser el que dirija este centro de trabajo donde los estudiantes trabajarán para desarrollar destrezas de resolución de problemas. Hoy escogerán un nombre para su grupo de aprendizaje cooperativo por medio de un consenso. Si el tiempo les permite pueden diseñar un cartel o una bandera para su grupo.

Work Station III: *Nuestro mundo creativo*: Poster Acrostics

The teacher can staff this station with a teaching assistant in the first round, who can then continue with the second and third round on her/his own. At this work station, students will have an opportunity to try one of the oldest forms of poetry, the acrostic. A "Background for the Teacher" reference is included below as well as an extension activity that can take place in groups, either at the end of this or the following session, or during available time in a "Homework/Learning Options" period, on an individual basis.

Academia already makes use of creative curriculum activities that connect learning to the arts. The *Nuestro mundo creativo* stations are an extension of that idea. They place an emphasis on creative activitity and intuitive involvement through the arts to help students continue to develop higher-order thinking skills, to give them yet another chance to try out new concepts in a lesson or unit, and to round up their learning experiences in Academia. Sometimes this station offers students added exposure to the language arts, and sometimes it uses them only as a point of departure.

Write down the word(s) "Our World," "Diversity," or "Unique," one letter to a line, on graph/chart paper or on the board. Leave plenty of space between the lines as students sometimes come up with long lines that may not fit all the way across. The idea is to include as much of what they say as possible. Change the word you use to create the poem with the rotation of each group so that you end up with three different group poems by the end of the session. (The word that was used to create the poem can also serve as the title, unless students have other suggestions.) If your students are older, you can have them brainstorm as a group, then separate to work individually on their poems.

Brainstorm with students feelings, thoughts, ideas, and images that may have crossed their minds during the first lesson — the word "peace," or "unity," for example, may have been words they thought about while working on the "Our World" puzzle. Ask questions that allow you to elicit the responses above. For example: How do people behave in a healthy/happy/kind world? (What does that make you think of?) What do they do or not do? How do they behave toward each other? How do they treat the plants, flowers, and animals? What kinds of dreams do they have? What would be a phrase or a line in a song they might sing?

Write the group responses on a separate sheet of chart paper or on the board. Allow five minutes for brainstorming. When you are done, using consensus, have students decide which of the thoughts, feelings, ideas, and/or lines they will, as a group, try to fit into the lines that start with the various letters of the word chosen for their group poem. Be creative. In some cases, you might need to make adjustments for all the lines to flow together. Don't impose changes; instead, offer suggestions. You may need to have the acrostic word run down the middle of the poem instead of at the beginning or end, or to have the word be "jumbled." What's important, especially for younger students, is the opportunity to formulate thoughts and ideas creatively, and to have a visual reminder of this process.

Centro de trabajo 3: Nuestro mundo creativo: Acróstico

El maestro/a y asistente pueden dirigir este centro de trabajo en la primera vuelta, luego pueden continuar solos o solas con la segunda y tercera vuelta. En este centro de trabajo los estudiantes tendrán la oportunidad de conocer un

poema acróstico, un tipo de poema muy antiguo. Se incluye mas adelante "Los conocimientos para el maestro" y la actividad de extensión que los estudiantes pueden hacer en grupos al terminar esta o la próxima sesión o individualmente durante la de opción de tarea para la casa.

La Academia hace uso de actividades creativas que conectan el aprendizaje con el arte. Los centros de trabajo de "Nuestro mundo creativo" son una extensión de esta idea. Estos centros enfatizan actividades creativas e involucran intuitivamente el arte para ayudar a los estudiantes a continuar desarrollando sus destrezas de pensamiento crítico y analítico, para darles una nueva oportunidad de probar nuevos conceptos en una lección o una unidad y para resumir su experiencia de aprendizaje en la Academia. Algunas veces este centro de trabajo expone a los alumnos a actividades de lenguaje y otras veces utiliza a estas sólo como punto de partida.

Escriba la palabra(s) "nuestro mundo", "diversidad" o "singularidad", una letra por línea, en un papel grande o en la pizarra. Deje bastante espacio entre las líneas porque a veces los estudiantes escriben oraciones largas que no caben en un renglón. La idea es incluir lo más que se pueda de lo que ellos dicen. Cambie la palabra que ha usado para crear el poema rotando cada grupo de tal manera que al final de la sesión terminarán con tres poemas diferentes, uno por cada grupo. (La palabra que se usó para crear el poema también se puede usar como título si los estudiantes no tienen otras sugerencias). Si los estudiantes son de grados superiores, deje que piensen en grupo y luego sepárelos para que trabajen en sus poemas individualmente.

Repase con los estudiantes los sentimientos, pensamientos, ideas e imágenes que cruzaron por sus mentes durante la primera lección — por ejemplo la palabra "paz", "singularidad". Haga preguntas que le permita obtener respuestas para lo siguiente: ¿Cómo se comporta la gente en un mundo saludable, felíz y generoso? (¿En qué te hace pensar esto?) ¿Qué es lo que ellos hacen o no hacen? ¿Cómo se comportan entre ellos? ¿Cómo tratan a las plantas, a las flores, y a los animales? ¿Qué clase de sueños ellos tienen? ¿Cuál seria una frase o linea de la letra de la canción que cantarían?

Escriba las respuestas del grupo en una hoja de papel grande aparte o en la pizarra. Permitale cinco minutos para repasar. Después de terminar, diga a los estudiantes que decidan qué pensamientos, sentimientos, ideas, o letras van a usar para escribir el poema de grupo que empezaron con las letras de las palabras que escogieron. Sea creativo, en algunos casos va a necesitar hacer algunos ajustes para que las lineas del poema fluyan. No imponga cambios, más bién ofrezca sugerencias. Es probable que las palabras del acróstico tengan que correr por el medio del poema en vez de ir al principio o al final o que las

palabras queden "mezcladas". Para los estudiantes de grados inferiores es una oportunidad importante para formular pensamientos e ideas creativamente y para tener un recuerdo visual de este proceso.

Nuestro mundo creativo: Background for the Teacher

The word "acrostic" comes from the Greek "acros" (outermost) and "stichos" (line of poetry). As a literary form, the basic acrostic is a poem in which the first letters of the lines, read downwards, form a word, phrase, or sentence. For example, in the following short acrostic (written by seventh-grader Juan Lugo) the vertical word is "our":

Open your mind to the
Universe, and
Run back home and get your lunch.

Some acrostics have the vertical word at the end of the lines, or in the middle. Here is what might be called a run-on double acrostic, with the last letter of each line capitalized only to make the example clearer:

Many times I
Yelled across the cosmoS
Not knowing to whoM
And/or what everlasting top bananA
Men had sought in faR
EternitY.

Acrostics are easy to write. First, you write vertically the word or phrase, then go back and fill out the lines, using as many words as you like. Try it with your own name. The acrostic is good for developing mental and verbal agility, especially when written at top speed. It is interesting to turn a word or phrase on its side and see what spills out. [Background information from Teachers & Writers Collaborative's *Handbook of Poetic Forms*.]

Nuestro mundo creativo: Referencia para el maestro

La palabra acróstico proviene del griego "acros" (más alejado) y "stichos" (forma poética). Como una forma literaria, el acróstico básico es un poema en el cual las primeras letras del renglón, cuando se leen hacia abajo, forman una palabra, una frase o una oración. Por ejemplo, en el siguiente acróstico corto la palabra vertical es "sal":

Somos buenos amigos y
Algunas veces nos gusta jugar, cantar y reir a plena
Luz del día

Algunos acrósticos llevan la palabra vertical al final o en el medio del renglón. También hay acrósticos dobles de texto seguido que llevan la última letra de cada reglón mayúscula sólo para clarificar el ejemplo. (Este acróstico no es la traducción literal de la versión en inglés debido a que en español las palabras cambian al traducirlas).

> Muchas veces los niños juegan juntoS
> Ellos gritan, ríen, y corren en el césped verdE
> Siempre que los vemos jugar contentos nos llenamos de felicidaD
> Aunque esto sea juego de niños nos colma de mucha alegríA

Los acrósticos son fáciles de escribir. Primero escriba la palabra o frase verticalmente, luego escriba en las líneas blancas la cantidad de palabras que quiera. Trate con su nombre. El acróstico es muy útil para desarrollar agilidad mental y verbal especialmente cuando se escribe rápidamente. Es interesante escribir una palabra o una frase al revés y ver que se lee al deletrearla. [Esta sección fue basada en información del libro *Handbook of Poetic Forms* de la organización Teachers & Writers Collaborative .]

Extension Activity

Poster Acrostics Activity

Needed Materials:

- ☆ Markers.
- ☆ Poster boards (3).
- ☆ "Natural world" materials.

Have students bring in something they love from the "natural world" that can be glued onto poster board; lightweight "nature objects" like a pressed flower or petal, a spring or autumn leaf, a blade of grass or lightweight bark from a tree. If you prefer, this activity can also take place in your surroundings during Academia. (As an alternative or a supplement to collecting "nature objects," students can make, directly onto poster board or on a piece of construction paper they can later cut out for pasting, a drawing of their favorite "nature world" thing: a bird, a butterfly, a cloud, etc.)

Have the students themselves, or a teaching assistant, transfer the group poems onto the poster boards. Make sure students sign the poem; perhaps with the name they've chosen for their teams. Clear three large areas on the floor, or three tables, where the groups can gather together. Spray adhesive can be used by the teacher or assistant to affix the "nature world" materials to the poster. In some cases, as with lightweight bark, you might want to tie an object with a string and attach it to the poster board with a staple, or loop it through a hole you can make with a hole puncher. Make sure students help

by telling you or the teaching assistant exactly where in the poster they want their "nature world" material to be placed. If you are not using any chemicals, they can affix their materials themselves with your help.

Closing (10 minutes)

Allow each cooperative learning group to report the name they have chosen. Each group can choose a team member to read their group acrostic after they've reported their team names.

Parent Link

At home, have parents enter into a discussion about what the family rules are. For example: who does what chores, what do children do to get their allowance, when can s/he watch television, etc. Have them talk about why we have these rules in the home.

In some traditional Latino families it might be uncomfortable to discuss why rules are made without seeing it as a challenge or a questioning of authority. To avoid this, the discussion could be a family talk about the choices parents have made to guide their families. In essence, discussing a family philosophy for living.

As an added family activity, you can have parents and children work together on an acrostic poem about their family's "uniqueness," that includes both that family's unique characteristics, traits, and their philosophy for living. You can prepare a handout students can take home to write the acrostic on. The title of the acrostic can be "Unique," with the words "My Family" going down on the page, and blank lines beside the letters for them to write their poetry lines on.

An alternative for younger students might be to compose, with the help of family members, a family memories book of drawings after reading the book from the literature link below.

Enlace familiar

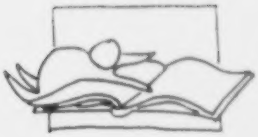
La familia puede tener una conversación acerca de las reglas familiares. Por ejemplo, quién hace los quehaceres de la casa, qué tiene que hacer el niño para recibir dinero de sus padres, cuando puede ver televisión, etc. Conversen acerca de las razones por las cuales existen estas reglas en la casa.

En algunas familias latinas tradicionales puede ser un poco incómodo hablar acerca del porqué se han hecho estas reglas sin que esto se perciba como un desafío o un cuestionamiento a la autoridad. Para evitar esto, la conversación familiar puede ser acerca de las decisiones que los padres han tomado para guiar

a sus familias. Esencialmente se trata de conversar sobre el estilo de vida de la familia.

Como una actividad familiar adicional, los padres y sus niños pueden trabajar juntos en un poema acróstico acerca de la "singularidad" de sus familias. Esto puede incluir dos cosas, las características únicas de la familia y las del estilo de vida de esta. Puede preparar una hoja de trabajo para que los alumnos lleven a la casa y escriban el acróstico. El título del acróstico puede ser "Unico", con las palabras "mi familia" yendo verticalmente en la página y dejando espacios blancos al lado de las letras para que los alumnos puedan escribir sus poemas.

Una alternativa para alumnos más pequeños sería el utilizar dibujos para componer el acróstico con la ayuda de algún miembro de la familia o de juntos hacer un libro de memorias de la familia después de leer el primer libro sugerido en el Enlace Literario a continuación.

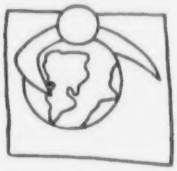


Literature Link

In *Family Pictures/Cuadros de familia*, Carmen Lomas Garza uses rich paintings and short, engaging narratives to collect her memories of a traditional childhood in South Texas. Bilingual. Recommended for grades 2-5.

In *Latino Rainbow: Poems about Latino Americans*, Carlos Cumpián documents elements of Latino culture and history as well as the achievements of Latino peoples in music, science, civil rights organizing, poetry, and baseball. These portraits show both the cultural wealth and the uniqueness of Latinos, and can be used as springboards for classroom discussion on other topics. Recommended for grades 4-6.

The Group
El grupo



Overview

In this lesson students continue becoming acquainted with one another and begin to explore the way scientists study the world around them. Students also produce writing samples which can be used for evaluation and assessment purposes.

Resumen

En esta lección los alumnos se siguen conociendo y comienzan a investigar cómo piensan los científicos cuando observan y estudian el mundo que los rodea. También producen ejemplos de redacción que se pueden usar para hacer evaluación y asesoría.

Key Skills

Making lists

Deciding which things are observable and measurable phenomena and which are not

Analyzing and categorizing

Testing phenomena for observability and measurability

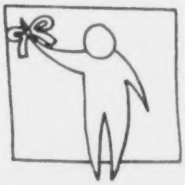
Destrezas claves

Hacer listas

Decidir cuáles cosas se pueden observar y medir y cuáles no

Analizar y categorizar

Investigar fenómenos para ver si se pueden observar y medir



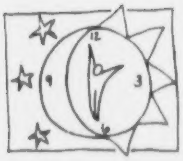
Preplanning

1. With teaching assistants, review instructions for collecting student writing samples. Make sure everyone helping with this process understands how to collect the samples.
2. Prepare a writing sample booklet for each student enrolled in the program. Put the child's name and age, your agency's name, and the date on the booklets. Include a "prompt" to stimulate writing in the student's dominant

language. (Please refer to the Implementation Guide for more information about this.)

3. Review the following terminology:

* ***observable***	* ***observable***
* ***measurable***	* ***mensurable***



Suggested Time

10 minutes — Welcoming
45 minutes — Homework/Learning Options
15 minutes — Hypothesis Brainstorming
20 minutes — Testing for Observability and Measurability
20 minutes — Writing Samples
10 minutes — Closing

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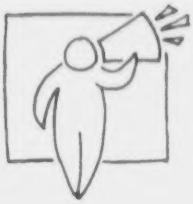
2 hours total

Materials

The teacher can conduct this lesson alone, if necessary, but teaching assistants would be useful. Materials needed include:

- A chalkboard or chart paper and marking pens.
- Packets for producing student writing samples — one for each student, in the student's dominant language.



Suggested Quote/Cita sugerida

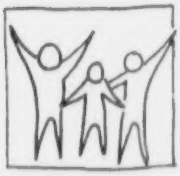
I was raised in what I consider to be not a melting pot, but a salad bowl. The onion stayed the onion, the tomato stayed the tomato, the lettuce stayed the lettuce, with maybe a little Russian or Italian dressing. And it tasted real good. No one lost their identity, and I thought that was what life was like.

—Edward James Olmos, as quoted in *The Fire in Our Souls*

Mr. Olmos is an actor, producer, and director in the film industry. His career was launched by his starring role in both the stage and screen version of *Zoot Suit*. Since then, he has starred in such films as *Stand and Deliver* and *Blade Runner*. He most recently directed the film *American Me*.

Yo crecí en lo que considero no una olla donde todo se funde, más bién un recipiente de ensalada donde la cebolla se mantiene como cebolla, el tomate se mantiene como tomate, la lechuga se mantiene como lechuga, tal vez con un poquito de salsa rusa o italiana. Y esto me supo muy bién. Nadie perdió su identidad y yo pensé que de esa manera es que era la vida.

—Edward James Olmos

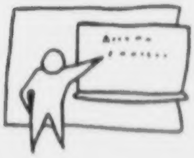


Welcoming (10 minutes)

Welcome children and take attendance. Review the "Our World" puzzle with students' names. Review the names of the cooperative learning groups by calling out the names of each cooperative learning team and asking the members to stand.

Homework/Learning Options (45 minutes)

Students should use this time to complete any homework assignments or to receive individualized tutoring.



Curriculum

Hypothesis Brainstorming (15 minutes)

Have the children make a list of things that they might want to know about their classmates' abilities and habits. Write these on the board or on chart paper. [If they have trouble thinking of things, refer back to Goldilocks, and ask them what they would have liked to know about her.] Some examples might be: How high can Juan jump? How many times does Maria blink her eyes when she's nervous? How well does Carlos dance? How many times will Gloria think about food today? etc. The lists should include both phenomena which are observable/measurable and some which are not. After compiling a list of 10-15 items move on to the next part of the lesson.

Testing for Observability and Measurability (20 minutes)

Go down the list of things that students wish to know about their classmates. State each "thing" in the form of a question. Then ask the students if each item of interest is ****observable*** and/or ****measurable***. Ask the students using this format:

☆ Can you actually see how high Juan can jump? [yes]

☆ Can you measure it? [yes]

☆ Can you actually see how many times Gloria thinks about food today? [no]

☆ Can you count them? [no]

By the end of this activity you should have helped students sort their questions into two groups — things that could be observed or measured and things that could not be observed or measured.

¿Qué cosas podemos observar y medir?

¿Pueden ver cuán alto puede saltar Juan? [Sí]

¿Lo pueden medir? [Sí]

¿Pueden ver cuántas veces pensó Gloria en comer hoy? [No]

¿Las pueden contar? [No]

Rationale...

Observability and measurability are the foundations for both math and science. The facts, principles, and methods that both branches of knowledge are based on are derived from these two concepts. Allowing students to explore observability and measurability will help them in the math and science activities included in the curriculum.

Razón fundamental...

Las destrezas de observar y medir son fundamentos de las matemáticas y las ciencias. Los datos, principios y métodos en que se basan estos conocimientos están derivados de estos dos conceptos. La exploración de la observabilidad y la mensurabilidad ayudará a los alumnos con las actividades de matemática y ciencias incluídas en el programa de estudios.

Collecting Writing Samples (20 minutes)

During this time, you may collect a writing sample from each child as part of the evaluation process. If children are absent today or enter the program later, make sure that you collect such a sample as soon as they enroll, if your program is using writing samples as part of its evaluation design.

Each child gets a pen or pencil and paper. Make sure to indicate students' names, their grade, and the date. Instructions should be provided in the child's dominant language.

A prompt consists of a few sentences which will elicit a story. (Please refer to the Implementation Guide for prompt samples.) Each student should receive a prompt written in his/her dominant language. Read the prompt out loud to the students. Then read it again, slowly and clearly. Students have up to 20 minutes to write on that topic and submit it to you.

Do not help the children in any way. If they want help, tell them to do the best they can, and that you are sure that they can express their own ideas. Let them know there will be no grade attached to these papers; that you just want to see the kind of writing they normally do.

If they can't produce a story, have them draw a picture and thank them for trying. On their sample write that they tried but could not produce a written story.

At the end of 20 minutes, collect all writing samples. Writing samples can be used to evaluate each child's normal writing ability. This information should assist you in cooperative learning team formation and in making future lesson modifications.

Closing (10 minutes)

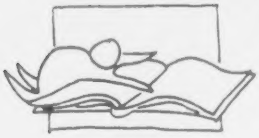
Review the lists developed by students at the start of the lesson. Remind them how they sorted them into things that could be measured and observed and things that could not. This skill is very important for scientists, as they will see in future lessons. If time allows, ask for volunteers to read from their "family uniqueness" acrostic poems. [Whether or not time allows, make sure to tie this into your next PAP meeting — perhaps, having parents and children share some of the poems to kick off the session.]

Parent Link

"24 Hours at My Family's House." With family members, have students produce a "list poem" of a few observable and measurable things their family does within one weekend day. They can say, for example, "Papi loves hugs. He gave Josue six hugs in 24 hours. Papi loves Josue's singing, and Josue loves singing, too. Josue sang three times; once in the shower, once in the backyard, and once just before dinner. Lupe and Fela love to dance. My 24 hours of observation were on Saturday, and Lupe and Fela danced in our living room for two hours: 3 salsas, 4 merengues, 4 quebraditas, and 6 cumbias."

Enlace familiar

"24 horas en la casa de mi familia". Con los miembros de la familia los alumnos producirán un poema "estilo lista" de algunas cosas observables y medibles que sus familias hacen durante un día del fín de semana. Pueden decir por ejemplo "A mi papá le gustan los abrazos. El le dió seis abrazos a Josué en 24 horas. A mi papá le gusta cómo canta Josué y a él también le gusta cantar. Josué cantó tres veces; una vez en la ducha, otra en el patio de atrás y por último antes de cenar. A Lupe y Fela le gusta bailar. Mi observación de 24 horas fue el día sábado. Lupe y Fela bailaron en la sala por dos horas: tres salsas, cuatro merengues, cuatro quebraditas y seis cumbias".



Literature Link

Ifeoma Onyefulu's book, *Emeka's Gift: An African Counting Story,* tells about a young boy of the Ibaji tribe in Southern Nigeria who goes around his community trying to decide on a gift for a visit to his grandmother's. Beautiful photographs and sidebars expand upon a narrative that tells about village life, while gifts are counted. Recommended for grades K-2.

Jon Scieszka and Lane Smith's book, *Math Curse,* is a must-have book filled with humor and imaginativeness. A young child feels cursed by the awareness of math in everydayness, so much that she sees math everywhere and in everything, and attributes it to her teacher, Ms. Fibonacci. She takes the reader through a journey of math in physical education class, geography, English, and her breakfast bowl. Recommended for grades 3-5.

Gobble Up Math, by Sue Mogard and Ginny McDonnel, offers fun and delicious ways to learn about patterns and sets, measurement and estimation, using nutrition and the Food Guide Pyramid. Recommended for grades K-3.

Lesson 4

The Students' World
El mundo de los alumnos

Overview

In this lesson, students will continue becoming acquainted with each other by playing a question game with the purpose of developing interviewing, listening, and public presentation skills. They will also learn how to reach a consensus and work as a team.

Resumen

En esta lección, los alumnos se siguen conociendo al participar en un juego de preguntas que desarrolla destrezas de entrevistar, escuchar y hacer presentaciones en público. También aprenden a llegar a un consenso y a trabajar en equipo.

Key Skills

Deduction

Asking and answering questions

Responding to an interview

Using a questionnaire

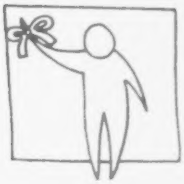
Destrezas claves

Deducir

Hacer preguntas y responder a ellas

Responder a una entrevista

Usar un cuestionario



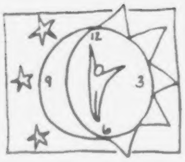
Preplanning

1. Make copies of Handouts 4.1 for the Secret Pal Game in the appropriate language for each child.
2. Make sure you have enough copies of any student entry interviews in the appropriate language for all students.
3. Review the procedures for completing any student entry interviews with anyone who will be assisting in this task. Remember that for young children or those who may have difficulty reading and understanding questionnaires,

you should conduct the exercise as an interview with an adult writing down the student's responses.

4. Review the following terminology:

   **questionnaire* **cuestionario*



Suggested Time

10 minutes — Welcoming
45 minutes — Homework
30 minutes — The Secret Pal Game
30 minutes — Student Interviews
5 minutes — Closing

2 hours total

Materials

A teacher and one or two teaching assistants are recommended for the full implementation of this lesson. In addition you will need the following:

- Name tags with the first name of each student printed in large letters with a dark marker.
- Handout 4.1, "Secret Pal Game Questionnaire."
- Copies of any "student entry interviews" for each child (in English or Spanish as appropriate).
- Chalkboard and chalk.
- Timer or bell.

Suggested Quote/Cita sugerida

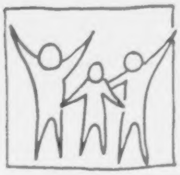
I was raised in what I consider to be not a melting pot, but a salad bowl. The onion stayed the onion, the tomato stayed the tomato, the lettuce stayed the lettuce, with maybe a little Russian or Italian dressing. And it tasted real good. No one lost their identity, and I thought that was what life was like.

—Edward James Olmos, as quoted in *The Fire in Our Souls*.

Mr. Olmos is an actor, producer, and director in the film industry. His career was launched by his starring role in both the stage and screen version of *Zoot Suit*. Since then, he has starred in such films as *Stand and Deliver* and *Blade Runner*, and directed the film *American Me*.

Yo crecí en lo que considero no una olla donde todo se funde, más bién un recipiente de ensalada donde la cebolla se mantiene como cebolla, el tomate se mantiene como tomate, la lechuga se mantiene como lechuga, tal vez con un poquito de salsa rusa o italiana. Y esto me supo muy bién. Nadie perdió su identidad y yo pensé que de esa manera es que era la vida.

—Edward James Olmos

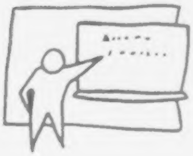


Welcoming (10 minutes)

Make sure all children have name tags today. During this opening session pass out a crayon to each child and ask everyone to decorate his or her name tag with a picture of something each really likes. Let children share the pictures they have drawn. Comment on the diversity of responses. (Let's see, Juan drew Batman, Maria drew a cat, Sandra drew a flower...look how many different things we like! etc.)

Homework/Learning Options (45 minutes)

Students should use this time to complete homework assignments, receive tutoring, or engage in free reading.



Curriculum

Secret Pal Game (30 minutes)

Tell the children:

"Today you will be learning about the specialness of people by playing the Secret Pal Game. You will be asking each other questions in order to find your "secret pal." You will then introduce her or him to the rest of the group."

"To play the game, the Secret Pal first has to give us clues as to who s/he is. Since each one of us will be a secret pal for someone else, we will all do this together by answering a little list of fun questions called a ***questionnaire.*** The answers to these questions are the clues we will use to find our secret pal."

Distribute the copies of the questionnaire and have the students fill them out as you read the questions out loud.

1. What is your favorite color?
2. Were you born in this country?
3. How many languages do you speak?
4. What is your favorite food?
5. What is your favorite playground game?
6. What is your favorite dessert?
7. Are you my secret pal?

Have everyone write "yes" to question 7. Collect the mini-questionnaire answer sheets. Place them in a bowl, box, or hat and mix them up.

Tell the students:

"Now, you will each pick a sheet from the box [or other container]. Begin to look for your secret pal when I give the signal. You must read the questionnaire answer sheet and begin asking people the questions on it to see if you can find your secret pal. If you need help reading the questions, the teaching assistants and I will be here to help you."

Have each student pick an answer sheet. (Make sure that it is not their own.) Give the signal (ring the bell) and let the students begin asking questions and finding their secret pals. After about 5-10 minutes, or when everyone has found their secret pal, bring the group together and have each person introduce his/her own secret pal by using this model:

"My secret pal's name is Lorena. Her favorite color is blue. She was born in Mexico. She speaks English and Spanish. Her favorite food is pizza. Her favorite playground game is basketball. Her favorite dessert is chocolate ice cream."

Then Lorena will get up and introduce her secret pal.

El juego del amigo secreto

Diga a los estudiantes:

"Hoy aprenderán sobre cómo cada uno de nosotros somos especiales y únicos por medio de un juego llamado "El amigo secreto". Van a hacer muchas preguntas para encontrar a su "amigo secreto" y luego se lo van a presentar al grupo".

Para jugar, primero el amigo secreto (o la amiga secreta) nos tiene que dar pistas. Como cada uno de nosotros es el amigo secreto de otra persona, todos lo haremos juntos al contestar un grupo de preguntas divertidas que llamamos ***cuestionario**. En las respuestas estarán las pistas para encontrar a nuestro amigo secreto".

Distribuya los cuestionarios a los alumnos para que los completen mientras lee las preguntas en voz alta.

1. ¿Cuál es tu color preferido?
2. ¿Naciste en este país?
3. ¿Cuántos idiomas hablas?
4. ¿Cuál es tu comida preferida?
5. ¿Cuál es tu juego preferido a la hora del recreo?
6. ¿Cuál es tu postre preferido?
7. ¿Eres tú mi amigo/a secreto/a?

Explique que todos deben responder "sí" a la última pregunta. Junte todos los cuestionarios en un recipiente y revuélvalos bien.

Luego explique:

"Cada uno va a tomar un cuestionario de la caja. Cuando yo toque la campana van a comenzar a buscar a su amigo secreto. Hay que leer la hoja del **_*cuestionario_** y hacerles las preguntas a varias personas para ver si pueden encontrar a su amigo secreto. Si necesitan ayuda para leer las preguntas, los asistentes y yo les ayudaremos."

Toque la campana para que los alumnos comiencen a hacerse preguntas. Cuando todos hayan encontrado a sus amigos secretos, cada uno presenta al suyo de la siguiente manera:

"Mi amiga secreta se llama Lorena. Su color preferido es el azúl. Nació en México. Habla inglés y español. Su comida preferida es la pizza. Su juego favorito es el baloncesto. Su postre favorito es el helado de chocolate".

Rationale...

The Secret Pal Game not only provides students with an opportunity to get better acquainted and prepare for student interviews, but serves as an important activity in teaching students a form of information-gathering. Information-gathering will prove to be a valuable skill in the math and science activities that follow.

Razón fundamental...

El juego del amigo secreto no sólo es una oportunidad para que los alumnos se conozcan mejor y se preparen para las entrevistas, sino que también es una actividad importante para enseñarles una manera de reunir información. La destreza de adquirir información es muy valiosa para las actividades de matemáticas y ciencias que siguen.

Student Entry Interview (30 minutes)

If you are conducting entry interviews with students, or having them fill out questionnaires for evaluation purposes, have students sit within cooperative learning groups with a teaching assistant or teacher.

Make sure each student has a questionnaire in his or her dominant language — the language in which you are providing their instruction — and a pen or pencil. Depending on the age and reading ability of the students, the teaching assistant or teacher may need to use the questionnaire as an interview guide, reading the questions aloud and allowing students time to respond. For free response questions, the adults may need to work with students individually, writing down their responses if the children cannot write.

Tell the children that today they will be filling out a questionnaire to tell you more about themselves, what they like and don't like, how they feel about school, and what languages they like to use. Since we're all individuals, everyone's answers will be a little different. Tell the students that there are no right or wrong answers and that there is no grade for this, so please give the answer that best describes how they feel.

Make sure the cover sheet is completely filled out with all students identifying information. Work through the questionnaires with students, helping them respond to each item. Make sure the questionnaire is completely filled out. Collect all questionnaires and thank the children for their good work.

Extension Activity

As an extension to this lesson, you could tell students about the different types of questions (such as "closed" and "open-ended" questions) that researchers use to gather information in interviews, questionnaires, and focus groups. These questions are their tools for getting the information they need. Perhaps, you can have students purposefully include one or two "closed" questions as part of the questionnaire they will write with their family in this lesson's Parent Link. The concept of asking questions can also be connected to journalism. You can, for example, explain to students that the most important facts in an article are those you get from asking the "the four W's and the H." That is to say, "Who? What? When? Where? Why? How?"

Closing (5 minutes)

Thank students for their good work today and tell them that, at the next session, they will be learning about how scientists begin to study problems and to find answers to questions they may have.

Parent Link

With their parents' assistance, have students develop a questionnaire at home that they can use to interview a family elder. Have them come up, verbally or in writing, with a goal for this information-gathering before they write their questionnaire. For example, "I want to find out what it was like when my grandfather was my age." What kinds of questions can they ask to get the responses that will give them a good sense of what things were like then? You might want to send home a list of sample questions for parents. (For example, What country were you in at my age? What was school like? What kind of music was playing on the radio?, etc.) Have students write down the

questions for the *questionnaire* and conduct the interview while the parents write down the elder's responses.

Enlace familiar

Con la asistencia de sus padres los alumnos desarrollarán un cuestionario para entrevistar a una persona mayor de la familia. Pida que ellos digan o escriban la razón por la cúal desean obtener esta información antes de escribir sus cuestionarios. Por ejemplo, "Me gustaría saber como era la vida antes cuando mi abuelo tenía mi edad."¿Qué tipo de preguntas puedan hacer para obtener respuestas que les den una buena idea de cómo eran las cosas en ese tiempo? Puede enviar a la casa una lista de preguntas como muestra para los padres. (Por ejemplo: ¿En qué país se encontraba usted a esa edad? ¿Cómo era la escuela? ¿Qué tipo de música se tocaba en la radio?, etc.) Pida a los alumnos que escriban las preguntas para el cuestionario y que hagan la entrevista mientras los padres escriben las respuestas de los adultos.

Handout 4.1

Secret Pal Game Questionnaire

1. What is your favorite color? ______________________________
2. Were you born in this country? ______________________________
3. How many languages do you speak? ______________________________
4. What is your favorite food? ______________________________
5. What is your favorite playground game? ______________________________
6. What is your favorite dessert? ______________________________
7. Are you my secret pal? ______________________________

Hoja de trabajo 4.1

Cuestionario para el juego del amigo secreto

1. ¿Cuál es tu color preferido?______________________________

2. ¿Naciste en este país?______________________________

3. ¿Cuántos idiomas hablas?______________________________

4. ¿Cuál es tu comida preferida?______________________________

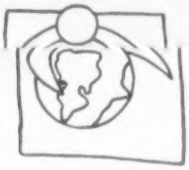
5. ¿Cuál es tu juego preferido a la hora del recreo?______________________________

6. ¿Cuál es tu postre preferido?______________________________

7. ¿Eres tú mi amigo/a secreta/o?______________________________

Lesson 5

What is Data?
¿Qué son los datos?



Overview

In this lesson, students are introduced to data collection. Working in their newly-formed cooperative learning groups, students explore the various ways in which information can be recorded and charted. Throughout the following two units, they begin to keep records of daily attendance and the weather.

Resumen

En esta lección se les presenta a los alumnos la recopilación de datos. Trabajando en sus nuevos equipos de aprendizaje cooperativo, los alumnos investigan varias maneras de anotar información y hacer gráficas. Durante las siguientes dos unidades comienzan a llevar registros en gráficas del clima y de la asistencia diaria.

Key Skills

Collecting data

Graphing

Consensus-building

Recording

Destrezas claves

Recopilar datos

Hacer gráficas

Llegar a un consenso

Llevar registros

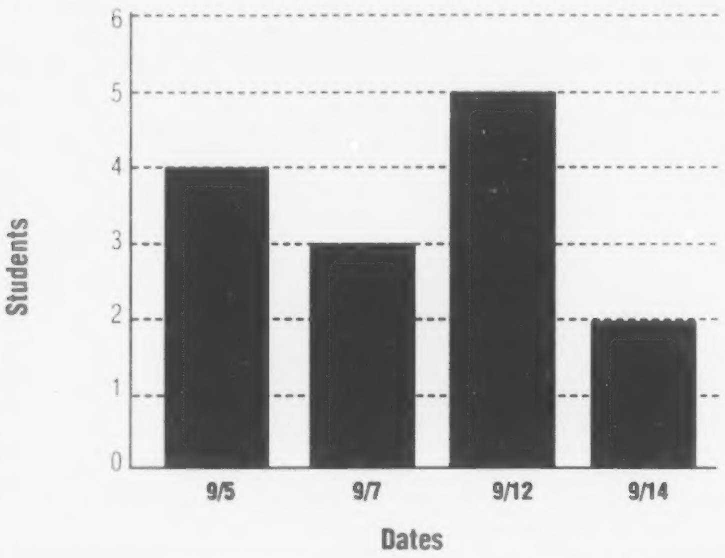
Preplanning

1. Review the following terminology:

* *data*	* *datos*
* *graph*	* *gráfica*

2. Prepare a chart which will be used for the following few months (until the end of Unit Three) to graph daily attendance. The chart should record the total number of students present on each day Academia meets. (See Figure 1 below.) Be sure to label the chart and both axes.

Figure 1



Suggested Time

10 minutes — Welcoming
45 minutes — Homework/Learning Options
20 minutes — Discussing Data Collection
30 minutes — Creating a Weather Chart
15 minutes — Closing

2 hours total

Materials

The teacher and teaching assistants are needed to implement this lesson. Students will be working in cooperative learning groups and guidance should be provided for each group. Materials needed include:

- A chalkboard, bulletin board, or chart paper.
- Marking pens.

☆ A piece of poster board and markers, or crayons, for each cooperative learning group.

Suggested Quote/Cita sugerida

I was raised in what I consider to be not a melting pot, but a salad bowl. The onion stayed the onion, the tomato stayed the tomato, the lettuce stayed the lettuce, with maybe a little Russian or Italian dressing. And it tasted real good. No one lost their identity, and I thought that was what life was like.

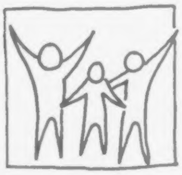
—Edward James Olmos, as quoted in *The Fire in Our Souls*

Mr. Olmos is an actor, producer, and director in the film industry. His career was launched by his starring role in both the stage and screen version of *Zoot Suit*. Since then, he has starred in such films as *Stand and Deliver* and *Blade Runner*, and directed the film *American Me*.

Yo crecí en lo que considero no una olla donde todo se funde, más bién un recipiente de ensalada donde la cebolla se mantiene como cebolla, el tomate se mantiene como tomate, la lechuga se mantiene como lechuga, tal vez con un poquito de salsa rusa o italiana. Y esto me supo muy bién. Nadie perdió su identidad y yo pensé que de esa manera es que era la vida.

—Edward James Olmos

SESSION PLAN

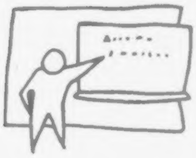


Welcoming (10 minutes)

Welcome students and take attendance. Call out the names of the cooperative learning groups and ask the members to stand.

Homework (45 minutes)

Students should use this time to complete any homework assignments, engage in free reading, or receive individualized tutoring.



Curriculum

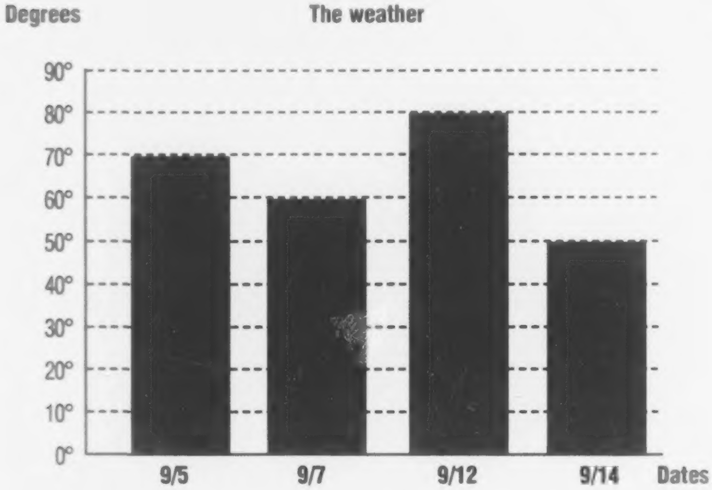
Discussing Data Collection (20 minutes)

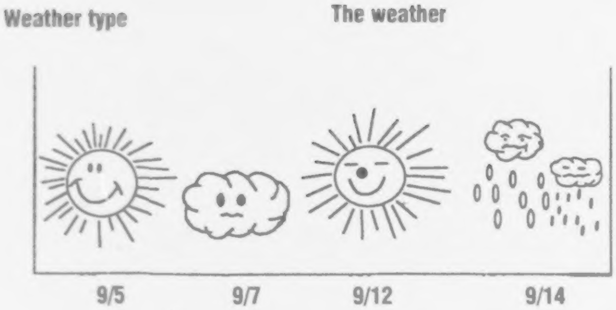
Explain to students that for many of their activities in Academia they will need to know how to collect, read, and interpret **_*data_**. To help students gain experience with these skills, the class will establish several data collection projects. Explain to students that **_*data_** is simply information. Tell students that in Academia they will be collecting information and then trying to make sense out of the information they have collected. Students will try to find out what this information or data tells them. Explain that an easy way to look at the information they are collecting, and to make sense of it, is by creating a **_*graph_**.

On class charts, which they will design today, students will graph attendance and weather **_*data_**. For the attendance **_*data_**, the class will use a chart that records the total number of students present on each day that Academia meets. Display the chart you previously created and demonstrate to the children how this chart records data or information.

To record the daily weather, a number of graphs are possible. Below are two possible examples (See Figure 1 and 2). Another option is to record weather **_*data_** on the Attendance Chart. Tell students that they will be working in their cooperative learning groups to discuss the various ways in which they can **_*graph_** the daily weather. They can use a thermometer to gather the information, or they can gauge the information using various adjectives such as sunny, cloudy, rainy, snowy, overcast, cold, etc.

Figure 1





Tell students the following:

"For the next few months we will be graphing data that we will be collecting every day we meet. We will graph the number of students who are here each day — the daily attendance — and the weather. One way to ***graph** the attendance is by counting the number of students who are here every day and recording that number. [Display the attendance chart you have prepared and demonstrate to students how recording will take place.] On one side (the vertical axis), we mark the number of students, and on the other side (the horizontal axis), we mark the date we are recording. It is important to write what we are recording on each side of the ****graph*** so we do not forget, and so that other people can understand what this graph is charting." [Point out that the chart has "number of students" written on the vertical axis, and "date" written on the horizontal axis.]

"How many students are at Academia today? How would we record that ***data*** on our chart?"

Dígale a los estudiantes:

"Durante los próximos meses vamos a hacer ***gráficas*** con los ***datos*** que juntemos todos los días. Vamos a anotar la asistencia diaria y el clima. Una manera de hacer una gráfica de asistencia es contar el número de alumnos que asisten a diario y anotarlo. De un lado de la gráfica (eje vertical) apuntamos el número de alumnos, y del otro lado (el eje horizontal) apuntamos la fecha. Es importante escribir esto para que no se les olvide y para que los demás puedan entender lo que dice la gráfica".

"¿Cuántos alumnos asistieron hoy a la Academia? ¿Cómo lo van a apuntar en la gráfica?"

Have a student record today's attendance. Tell students that they will each have an opportunity to graph the attendance because we will continue collecting and recording this information for the next couple of months. Next, ask students how they think they should record the daily weather. Record some of these ideas on the board, and then tell students that they will be working in their cooperative learning groups to come up with an idea for a chart to record weather data.

Ask the following:

"This is a good way to graph one type of information — attendance — but how do you think we should graph the weather? How do you know what the weather is like each day? [Read an outdoor thermometer, feel the weather, feel the warmth or coldness of the air, etc.] How would you record this on a daily basis? We would need to know two things — the date you are recording, and what the weather was on that day."

Gráfica del clima

Pregúntele a los estudiantes:

"Esta es una buena manera de hacer una gráfica de un tipo de información — la asistencia — pero ¿cómo creen que se podría hacer una gráfica del clima? ¿Cómo vamos a saber qué clima hace cada día? [Vemos un termómetro, o sentimos frío o calor]. ¿Cómo lo anotarían diariamente? Necesitamos saber dos cosas — la fecha del día que se está anotando y el clima que hace ese día. Cada equipo va a hacer una ***gráfica*** con estos ***datos***".

Creating a Weather Chart (30 minutes)

Have students sit in their cooperative learning groups and "brainstorm" about a way in which they can record the daily weather. Before the groups begin their work suggest that each group member assume a role. Roles may include the following:

- Time-Keeper
- Artist/Designer
- Reporter
- Supplies Monitor
- Participation Monitor
- Praiser
- Recorder

Papeles del equipo

- Tomador de tiempo
- Artista/diseñador
- Reportero
- Monitor de materiales
- Monitor de participación
- Animador
- Apuntador

The recorder's job is to write down the group's answers to the questions. The time-keeper should watch the time and let the group know when there are only a few minutes remaining. The participation monitor should make sure that everyone has a chance to talk and share ideas. The praiser's job is to affirm people's contributions (e.g., "Good point!", "Nice job!"). The reporter summarizes the group's findings and reports back to the whole class. S/he also reports on the good job their group did in terms of participation.

Allow the groups time to come up with an idea, but make sure that you and teaching assistants help facilitate this process. Ask questions that will lead them to a reasonable and simple chart to record this data (such as those illustrated in Figure 1 and 2).

Closing (15 minutes)

Have the reporter for each team present the group's idea to the rest of the class. Discuss the various ways in which it is possible to record the same data or information. Ask the class to decide which of the charts should be adopted to record this information on a daily basis.

Parent Link

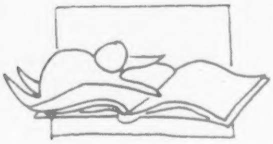
Encourage students to develop a family chart. On the chart, have students show the number of members in their family along with, perhaps, a bar graph that shows family features the Academia class may want to explore. Examples could be:

- ☆ Female/male members
- ☆ People over age 25, or under 18
- ☆ People 13 and under
- ☆ People who have long hair/short hair
- ☆ People who have eyeglasses/no eyeglasses
- ☆ Those who prefer tennis shoes or hard shoes
- ☆ Those who prefer hotdogs or hamburgers
- ☆ Those who prefer tacos or enchiladas

Enlace familiar

Anime a los alumnos a crear un cuadro de la famila. En el cuadro los alumnos pueden mostrar el número de personas que hay en su familia y hacer una gráfica de las características de la familia que la clase de Academia le gustaría explorar. Los siguientes son algunos ejemplos:

- ☆ Familiares femeninos y masculinos
- ☆ Personas mayores de 25 o menores de 18 años de edad
- ☆ Personas de 13 años o menores
- ☆ Personas que tienen cabello largo o corto
- ☆ Personas que usan lentes o nó
- ☆ Personas que prefieren zapatos deportivos o zapatos duros
- ☆ Personas que prefieren perros calientes o hamburguesas
- ☆ Personas que prefieren tacos o enchiladas



Literature Link

Diane Kaiser's *A Book of Weather Clues* rounds up fun-filled weather clues from birds, insects, plants, houses, clouds, wind, and rainbows. It is interspersed with poetry about weather themes, and contains one blank page per month on which readers can jot down their own weather observations. Recommended for grades 3-6.

El libro de las nubes (in Spanish) was originally released in English by the same publisher (see "Recommended Readings") in 1975. In it, author Tonie dePaola offers information on the different types of cloud formations, and captures the magical wonder of sky-watching. Recommended for grades 1-3.

90

Lesson 6

Experimentation: The Roller Derby (Part I)
La experimentación: ¡A rodar! (Parte I)

Overview

This activity introduces the concept, the essential elements, and vocabulary of an **experiment*. Students are introduced to the world of scientists by conducting their own experiment. They predict the rolling speeds of large and small cans and set up a fair test to check the accuracy of their predictions. The activities used in this lesson as well as in Lesson 7 were developed by the National Science Foundation for National Science and Technology Week.

Resumen

Esta actividad presenta a los alumnos el concepto, los elementos esenciales y el vocabulario de un **experimento.* Entran en el mundo de los científicos haciendo sus propios experimentos. Los alumnos hacen predicciones acerca de la velocidad con que hacen rodar las latas grandes y pequeñas y organizan una prueba válida para comprobar si sus predicciones fueron acertadas. Esta lección y la Lección 7 utiliza actividades desarrolladas por el National Science Foundation para la Semana Nacional de Ciencias y Tecnología.

Key Skills

Experimenting
Collecting data
Observing
Inferring
Comparing
Predicting
Drawing conclusions
Working cooperatively
Writing

Destrezas claves

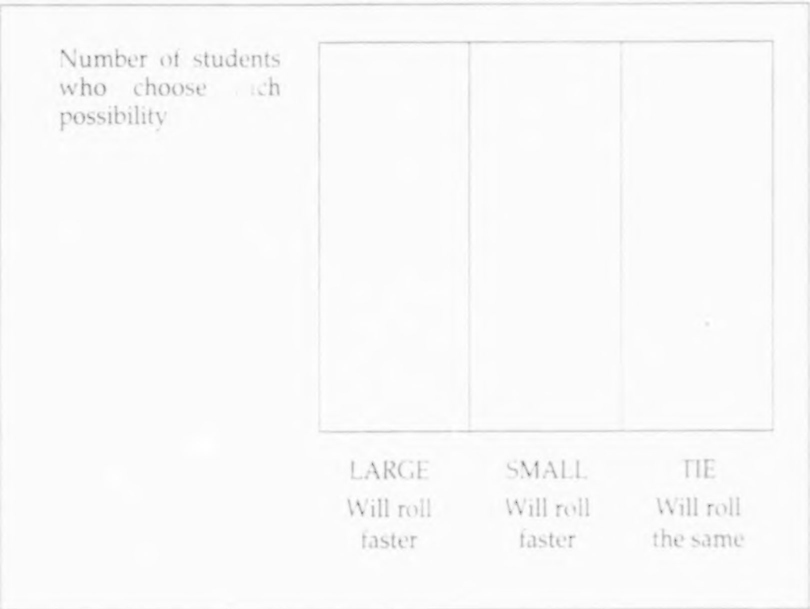
Hacer experimentos
Juntar datos
Observar

Hacer inferencias
Comparar
Hacer predicciones
Sacar conclusiones
Trabajar cooperativamente
Redactar

Preplanning

1. Prepare the weather or temperature chart which the class designed and agreed upon in the previous lesson. Make sure the chart and both axes are labeled. The chart should be located in an area with easy access for daily updates.
2. Copy the "Prediction Chart," shown in Figure 1 below, onto the board or onto a large piece of chart paper:

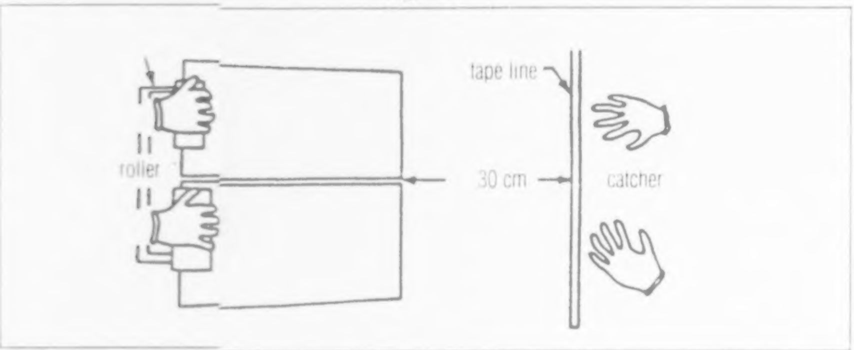
Figure 1



3. Duplicate Handout 6.1 "Roller Derby Chart" — one per student.
4. Remove both ends from the large and small cans. Smooth any sharp edges with a file.
5. Place pieces of masking tape opposite each other on the inside edges of all of the cans. These pieces of tape will be used to line up the cans in the starting position.

6. Strips of paper that measure approximately 30 centimeters. These strips will act as a measuring tape for each team to mark the finish line. You need to make sure that the strips are similarly measured so that each of the racing courses is as identical to each other as possible.
7. Create "racing areas" for each cooperative learning team. Make sure there is enough room for each group to set up two ramps, side by side, in each area.
8. Prepare a "racing area" and ramp as an example of what each team will need to construct. Use Figure 2 next page to assist in the construction of your "racing area."

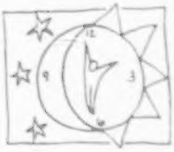
Figure 2



For each ramp use a stack of ten books, and rest the piece of cardboard or game board on the stack to create a ramp. Using the masking tape, create a finish line that is approximately 30 cm. away from the end of the ramp. Use the masking tape to create a starting line on the top of the ramp.

9. Review the following terminology:

**experiment*	**experimento*
**prediction*	**pronosticar*
**hypothesis*	**hipótesis*
**fair test*	**prueba, *comprobación*



Suggested Time

10 minutes — Welcoming
45 minutes — Homework/Learning Options
20 minutes — Guided Discussion
25 minutes — Roller Derby
10 minutes — Debriefing
10 minutes — Closing

2 hours total

Materials

The teacher can conduct this lesson alone, if necessary. Since students will be working in their cooperative learning teams, you may find that teaching assistants are helpful in ensuring that each team receives some individualized instruction and guidance. You will need the following materials:

- One large, empty can (e.g., a coffee can) for each cooperative learning team.
- One small, empty can (e.g., a tomato paste can) for each cooperative learning team.
- Two rectangular pieces of cardboard of equal size and similar texture (game boards work well) for each cooperative learning team.
- Two identical stacks of 10 books for each team.
- Crayons; one per student.
- Strips of paper identically measured at approximately 30 centimeters in length (one per team).
- Masking tape.
- Copies of Handout 6.1, "Roller Derby Chart."

Suggested Quote/Cita sugerida

I was raised in what I consider to be not a melting pot but a salad bowl. The onion stayed the onion, the tomato stayed the tomato, the lettuce stayed the lettuce, with maybe a little Russian or Italian dressing. And it tasted real good. No one lost their identity, and I thought that was what life was like.

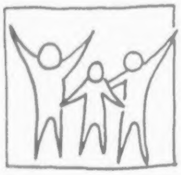
—Edward James Olmos, as quoted in *The Fire in Our Souls*

Mr. Olmos is an actor, producer, and director in the film industry. His career was launched by his starring role in both the stage and screen version of *Zoot Suit*. Since then, he has starred in such films as *Stand and Deliver* and *Blade Runner*, and directed the film *American Me*.

Yo crecí en lo que considero no una olla donde todo se funde, más bién un recipiente de ensalada donde la cebolla se mantiene como cebolla, el tomate se mantiene como tomate, la lechuga se mantiene como lechuga, tal vez con un poquito de salsa rusa o italiana. Y esto me supo muy bién. Nadie perdió su identidad y yo pensé que de esa manera es que era la vida.

—Edward James Olmos

SESSION PLAN



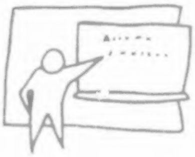
Welcoming (10 minutes)

Welcome students and ask for student volunteers to chart the daily attendance and weather. You may need to take some time to familiarize students with the process of charting, and to review the concept of data collection.

Tell students that they are going to be conducting an ***experiment** today. Scientists conduct experiments all the time. Have they ever conducted an ***experiment**? Tell them that experiments are just tests to discover or demonstrate something. People conduct experiments all the time to answer questions that they may have — and almost all people have questions about something. Every person wonders about something — this makes us all scientists. When we wonder we become scientists. Sometimes, to discover the answer to the thing we are wondering about we conduct ***experiments**. Many great things have been discovered because people have been curious about something and have asked the question, "Why?" Ask the class what they have wondered about.

Homework/Learning Options (45 minutes)

Students may use this time to complete homework assignments or to receive individualized tutoring.



Curriculum

Guided Discussion (20 minutes)

Working with the whole group, discuss the purpose of the lesson: to introduce the concept of an experiment and some of the vocabulary that students will encounter as they learn about experiments. Tell students they will be working in their cooperative learning teams. Each team should assign the following roles: Reporter, Praiser, Gatekeeper, and Materials Monitor.

Show students the two sizes of cans. Ask them if they wonder which can will roll faster — a large can or a small can? Let students answer this question and explain their answers.

Rationale...

Students work with their cooperative learning teams to complete a hands-on activity for the first time in this lesson. It is important that roles be assigned in this activity so that each student feels like a contributing member of her/his team. In addition, the assignment of a "gatekeeper" will ensure that the group works together to come up with a prediction. It is important that all team members learn and understand the concept of consensus early in Academia, since they will be working in groups often.

Razón fundamental...

En esta lección, por primera vez, los alumnos trabajan con sus equipos de aprendizaje cooperativo para completar una actividad práctica. Es importante asignar a cada alumno el papel que va a desempeñar en ésta actividad para que cada uno sienta que está contribuyendo a su grupo. También la tarea de "portero/cuidador" le asegurará que el grupo trabaje en conjunto para llegar a hacer una predicción. Es importante que todos los miembros del grupo aprendan y entiendan el concepto de consenso tempranamente en la Academia porque ellos trabajarán frecuentemente en grupos .

Explain to students:

When scientists make a statement about what might happen, they are making a ***prediction**. A scientist would say, for example, "I ***predict** that large cans will roll faster than small cans," or "I ***predict** that small cans will roll faster than large cans," or "I ***predict** that large cans and small cans will roll at the same rate." Predictions are just educated guesses, and scientists make predictions or state ***hypotheses** about things all the time. A guess or a prediction made at the beginning of an experiment is called a ***hypothesis**.

Now, I want all of you to make a prediction about the cans. You can choose only one of the three predictions. Before telling me your prediction, you will get together with your cooperative learning team to discuss your predictions.

Explique a los estudiantes:

Cuando los científicos afirman que algo podría suceder, están haciendo una ***predicción**. Por ejemplo, un científico diría, "Yo ***pronostico** que las latas grandes rodarán más rápido que las pequeñas," o "Yo ***pronostico** que las latas pequeñas rodarán más rápido que las grandes," o "Yo ***pronostico** que las latas rodarán a la misma velocidad." Una predicción es un cálculo informado, y los científicos siempre hacen predicciones o ***hipótesis.** El cálculo o predicción que se hace al comenzar un experimento se llama ***hipótesis.**

Ahora quiero que todos ustedes hagan una predicción sobre las latas. Solamente pueden escoger una de las tres predicciones. Antes de decirme cuál escogieron, se van a juntar con su equipo a discutir sus predicciones.

Allow the cooperative learning groups to gather together and provide each team with approximately five minutes to discuss predictions. Tell each team that they will have to reach a consensus and make one prediction as a team. Referring to the "Prediction Chart," which you will have copied onto the chalkboard or onto a large piece of paper, tell students that you will record each team prediction. Have a student from each group raise his/her hand to indicate his/her team's predictions and record them on the chart. Allow teams to explain their predictions.

After recording students' predictions, state the following:

"Now that every team has made a prediction, we will be conducting an ***experiment*** to test these predictions. Does anybody have an idea about how we might test our predictions and find out which size can rolls faster? [Allow time for some responses.] We will have a race — a "roller derby" — to see which can rolls faster or if the two cans roll at the same speed. We will all become scientists in order to test our predictions."

Después de registrar las predicciones, diga lo siguiente:

"Ahora que cada equipo a hecho una predicción, vamos a hacer un experimento para probarlas. ¿Tiene alguien una idea sobre cómo podemos probar nuestras predicciones y averiguar cuál tamaño de lata rueda más rápido? [Deje que contesten]. Vamos a hacer una carrera para ver qué lata rueda más rápido o si las dos ruedan a la misma velocidad. Nos vamos a convertir en científicos para probar nuestras predicciones."

Roller Derby (25 minutes)

Show the class the ramp setup and roll one can down the ramp.

Explain to students:

"There will be two ramps, side by side. You will all work with your cooperative learning teams, and one student will roll a large can down one ramp. At the same time, another student will roll a small can down the other ramp. These are the two 'starters'. Another team member will be a short distance from the end of the ramps and will be 'the catcher '— s/he will catch both cans. 'The catcher' will tell the rest of the class which can won the race."

Provide each team member with a copy of the "Roller Derby Chart." Remind them of their predictions about rolling large cans and small cans. Point out the selections at the bottom of the chart. Tell students that they will use a crayon and circle their team prediction on the "Roller Derby Chart." (Remind them that they can only choose one of the three predictions.)

Before each team begins to construct their two ramps out of the books and cardboard supplied, ask students the following:

"How can we tell if the race is fair? [Allow for responses]. Would it be fair if one student pushed the can and another student just let the can go? Would it be fair if one student started the can at the top of the ramp while another student rolled the can from the middle of the ramp? What would be a fair starting position? If you look inside each of the cans you will notice pieces of tape. In order for the race to be fair, the 'starters' need to make sure that the pieces of tape in the two cans are both on the starting line. [Display starting line on the ramp you have set up.] The 'starters' should hold the cans at the top of the ramp with one finger and release them when somebody on the team says, 'Ready, set, go!' The two 'starters' will release the cans when the team member says 'go.' It is important that we conduct a ***fair test** in order to test our predictions. If we do not do a ***fair test**, then there is no way of knowing which can really rolls faster."

"And, how will we be able to tell which can actually wins the race? Because the large can is much larger than the small can; if large cans really roll faster than small cans, the large can should roll much faster. And, if a small can really rolls faster, it should roll much faster, because it is much smaller. The 'catcher' and the rest of the team have to decide which can won the race or if the race ended in a tie. Remember, before you can declare one can the winner, there should be a big difference in the time it takes for the cans to hit the 'catcher's' hands. If the catcher cannot really tell which can hit first, then the score should be marked a 'tie.' If something goes wrong, you may have to do some 'take-overs.'"

"The 'catcher' will kneel at the finish line that you will measure with the strip of paper and mark with the tape. Hold one end of the strip at the end of the ramp and use tape to mark the place where the strip ends. Use a long strip of tape that marks a finish line for both ramps. This is the finish line and this is where the catcher's hands should be."

"Before you start your races, make sure that everything seems fair. Are the stacks of books the same height? Are the ramps the same length?"

Carrera de latas

"El 'atrapador' y los demás compañeros de equipo tienen que decidir qué lata ganó la carrera, o si hubo empate. Acuérdense que antes de nombrar la lata ganadora, debe haber una gran diferencia en el tiempo que se tardan las dos latas en llegar a las manos del 'atrapador'. Si el 'atrapador' no puede decidir cuál lata llegó primero, se debe declarar un empate. Si algo no funciona, deben volver a hacer la carrera".

"Va a haber dos rampas, una junto a otra. Todos van a trabajar con sus equipos, y una persona va a rodar una lata grande por una rampa. Al mismo tiempo, otra persona va a rodar una lata pequeña por la otra rampa. Estas dos personas serán los 'arrancadores'. Otra persona del equipo estará cerca del final de la rampa y será el 'atrapador' — atrapará las dos latas. El 'atrapador' les dirá a los demás qué lata ganó la carrera".

Antes de que los equipos empiezen a construir sus rampas, haga las siguientes preguntas:

"¿Cómo podemos saber si la carrera fue justa? [Deje que contesten]. ¿Sería justo si un alumno empujara la lata y el otro sólo la soltara? ¿Sería justo si un alumno rodara la lata desde lo más alto de la rampa mientras el otro la rodara desde la mitad? ¿Cuál sería el punto de arranque más justo? Si ven adentro de las latas verán pedazos de cinta. Para que la carrera sea justa, los 'arrancadores' tienen que asegurar que los pedazos de cinta estén exactamente sobre la línea de arranque. [Muestre la línea de arranque en la rampa que construyó usted]. Con un dedo, los 'iniciadores' detienen las latas en la punta de la rampa, mientras alguien del equipo dice, '¡En sus marcas, listos, fuera!' Las sueltan cuando esta persona diga '¡Fuera!' Es muy importante hacer una ***prueba justa*** para poner a prueba nuestras predicciones. Si no hacemos una ***prueba justa*** no hay manera de saber cuál lata de veras rodó más rápido".

"Y ¿cómo vamos a saber qué lata de veras ganó la carrera? Como la lata grande es mucho más grande que la lata pequeña, si es cierto que las latas grandes realmente ruedan más rápido que las pequeñas, la lata grande deberá rodar mucho más rápido. Y si una lata pequeña de veras rueda más rápido, deberá rodar mucho más rápido, porque es mucho más pequeña."

"El 'atrapador' estará hincado en la línea de llegada, que van a medir con la tira de papel y marcar con la cinta. Detengan una punta de la tira al final de la rampa y usen la cinta para marcar dónde termina la tira. Usen una tira larga de cinta para marcar la línea de llegada para las dos líneas. Esta es la línea de llegada y aquí debe tener las manos el 'atrapador.'"

Make sure the ramps are properly constructed before the teams begin the races. In addition, you need to make sure that the ramps approximate each other in order to accurately compare team results in the next lesson. After the ramps are constructed, tell each team that they will run the "roller derby" four times. Tell students to use their chart to mark which can won or if there was a tie. Demonstrate to students that they should mark an "x" or color-in the appropriate box for each of the four races. The rest of the chart will be filled in at the next Academia.

Journal (10 minutes)

Have students describe the experiment they conducted today in Academia, and say whether or not they were correct in their predictions. Remind students that they can draw in their journals if they are having difficulty describing the experiment in words.

Closing (10 minutes)

Review the day's activities and some of the key words introduced. In particular, ask students to recall the meaning of the word ***prediction**. Ask students to make a ***prediction**, and then a ***hypothesis** about the number of students who will attend the next Academia. Write the ***prediction** or ***hypothesis** in a visible place so that you can refer to it at the next class meeting.

Remind students that they will complete the "Roller Derby Chart" at the next Academia, and try to determine if there is a real winner. They will need Handout 6.1 for the next lesson.

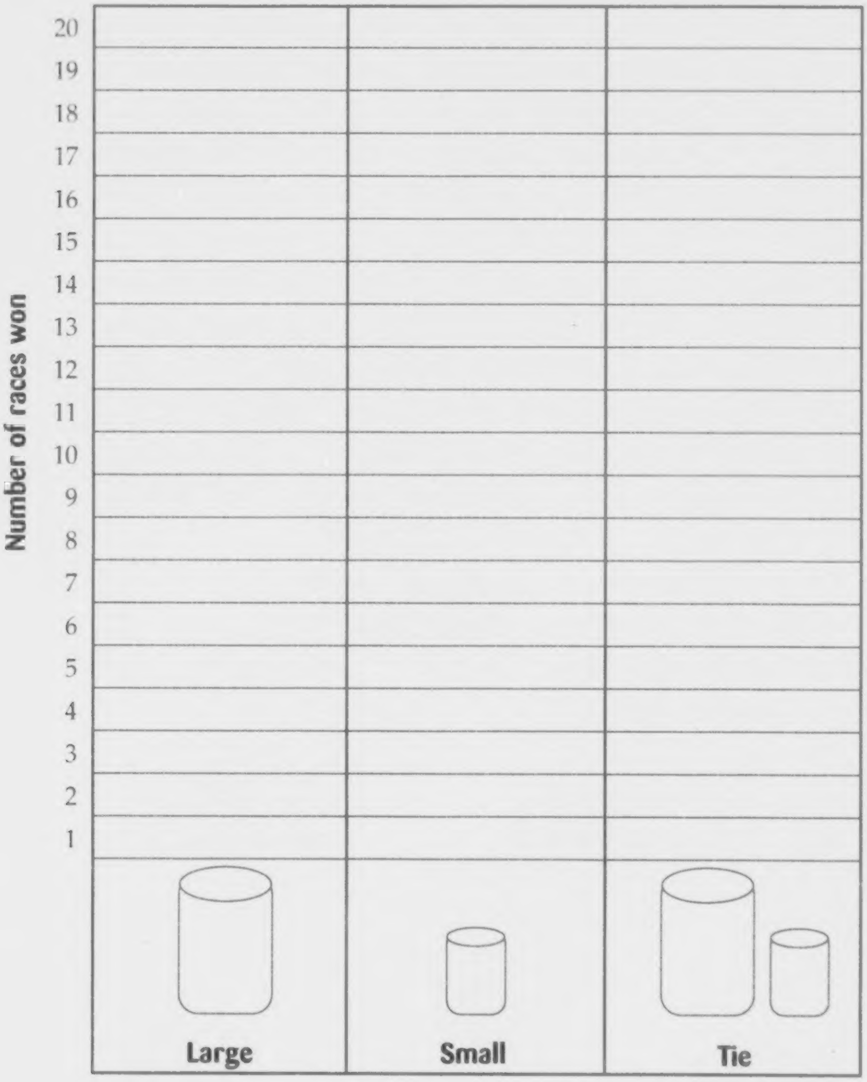
Parent Link

For this lesson, try a Project PRISM activity. Encourage parents to visit a science and technology museum in their community to learn more about experiments, predictions, and fair tests with their children. Many museums have special areas, exhibits, and programs just for children where they can learn in a hands-on way. They can use equipment that most schools do not have the money, space, or technical expertise to own. You can facilitate this experience by providing parents with a list of these museums or a directory. Or, you can let them know they can find them in the Yellow Pages, by asking the public library, or by calling their local Chamber of Commerce.

Enlace familiar

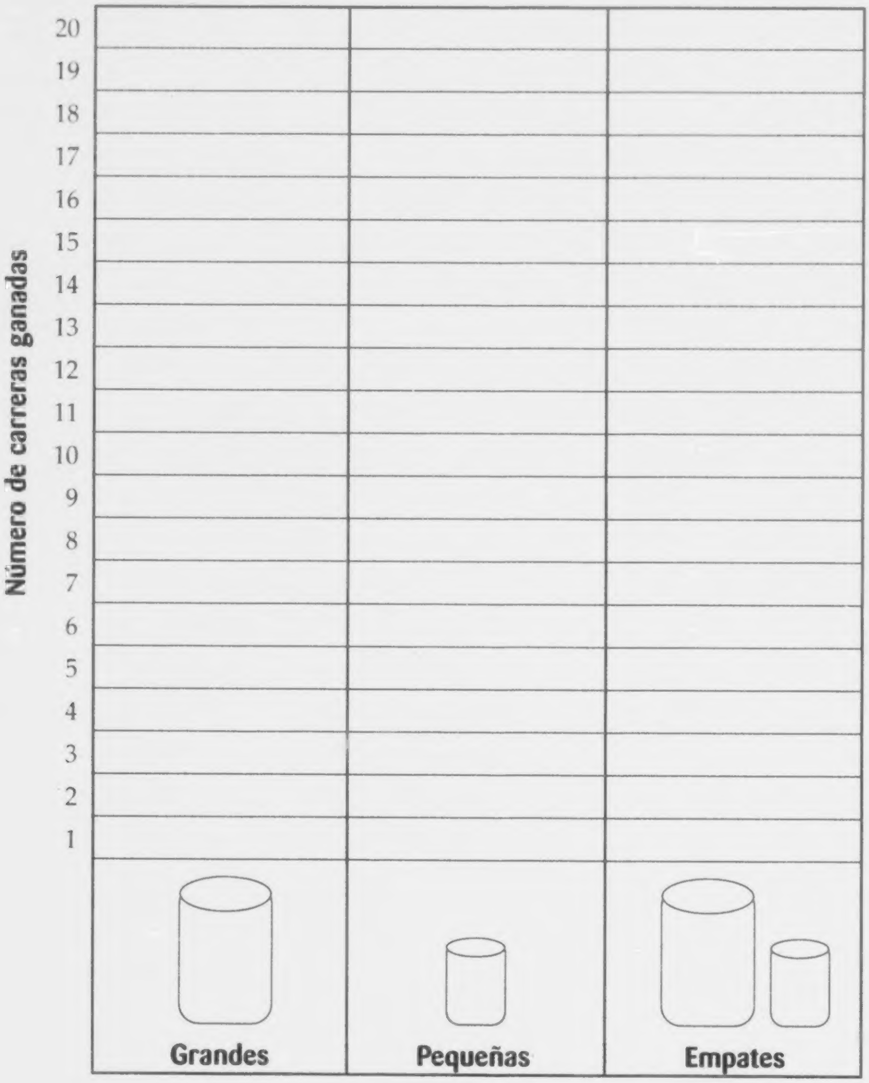
Trate de hacer una actividad del proyecto PRISM para esta lección. Anime a los padres a visitar con sus niños un museo de ciencias y tecnología de su comunidad para aprender acerca de los experimentos, predicciones y comprobaciones. Muchos museos tienen áreas especiales, exhibiciones y programas sólo para niños donde pueden aprender de una manera práctica. También pueden usar equipos que la mayoría de las escuelas no pueden tener por falta de dinero, espacio o experiencia técnica. Puede facilitar esta experiencia para los padres dandoles una lista o un directorio de este tipo de museos. También les puede dejar saber a ellos que pueden encontrar esta información en las páginas amarillas, preguntando en las bibliotecas públicas o llamando a la cámara de comercio.

Handout 6.1
Roller Derby Chart



Hoja de trabajo 6.1

Tabla para la carrera de latas



Lesson 7

Experimentation: The Roller Derby (Part II)
La experimentación: ¡A rodar! (Parte II)

Overview

This lesson is designed to reinforce students' familiarity with the concept and vocabulary of an experiment, and to give them some first-hand experience in interpreting the results of an experiment. It concludes with a review of the key vocabulary terms introduced in Unit 1.

Resumen

En esta lección se refuerza el concepto y el vocabulario de un experimento y los alumnos tienen la experiencia práctica de interpretar los resultados. La lección termina con un repaso del vocabulario clave presentado en la Unidad 1.

Key Skills

Interpreting data

Drawing conclusions

Working cooperatively

Graphing

Recording

Developing vocabulary

Destrezas claves

Interpretar datos

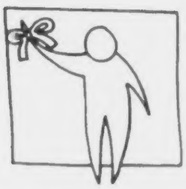
Sacar conclusiones

Trabajar cooperativamente

Hacer gráficas

Hacer anotaciones

Desarollar más vocabulario

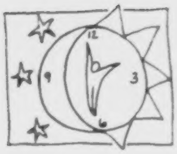


Preplanning

1. Enlarge one copy of the "Roller Derby Chart," or draw an enlarged version on the board or on a large piece of paper.
2. Make copies of Handout 7.1, "Unit Review of Vocabulary." Make enough copies for every student.

3. Review the following terminology:

*observed result	*resultado observado
*conclusion	*conclusión



Suggested Time

10 minutes — Opening
45 minutes — Homework/Learning Options
10 minutes — Guided Discussion
25 minutes — Did We Get a Winner?
25 minutes — Team Wordbank Review
5 minutes — Closing

2 hours total

Materials

The teacher can conduct this lesson alone, if necessary. You will need the following materials:

- ☆ Handouts the team used in Lesson 6.
- ☆ Enlarged version of Handout 6.1, "Roller Derby Chart."
- ☆ Copies of Handout 7.1, "Unit Review of Vocabulary."

Suggested Quote/Cita sugerida

I was raised in what I consider to be not a melting pot but a salad bowl. The onion stayed the onion, the tomato stayed the tomato, the lettuce stayed the lettuce, with maybe a little Russian or Italian dressing. And it tasted real good. No one lost their identity, and I thought that was what life was like.

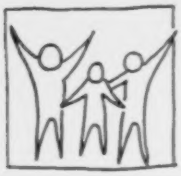
—Edward James Olmos, as quoted in *The Fire in Our Souls*

Mr. Olmos is an actor, producer, and director in the film industry. His career was launched by his starring role in both the stage and screen version of *Zoot Suit*. Since then, he has starred in such films as *Stand and Deliver* and *Blade Runner*, and directed the film *American Me*.

Yo crecí en lo que considero no una olla donde todo se funde, más bién un recipiente de ensalada donde la cebolla se mantiene como cebolla, el tomate se mantiene como tomate, la lechuga se mantiene como lechuga, tal vez con un poquito de salsa rusa o italiana. Y esto me supo muy bién. Nadie perdió su identidad y yo pensé que de esa manera es que era la vida.

—Edward James Olmos

SESSION PLAN



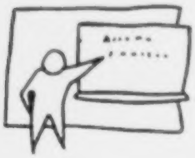
Welcoming (10 minutes)

Welcome students and assign a few students (volunteers) to chart the day's attendance and weather. Check the prediction they made during the previous lesson about today's attendance. Was their hypothesis about today's attendance correct? Invite students to come up to the board and write down any of the terms they remember from the previous lesson. Read them together and ask if anyone in the group has other words to add.

Tell students that they will find the answer to the question they asked during the last lesson — "Do small cans and large cans roll at the same speed?" They will also learn a few more words that are related to conducting scientific experiments, and towards the end of Academia today they will review many of the words they learned in this unit.

Homework/Learning Options (45 minutes)

Students may use this time to complete school work or to receive individualized tutoring.



Curriculum

Guided Discussion (10 minutes)

Ask students to sit together with their cooperative learning teams. In groups, allow students to review the ***observed*** results of the four races they conducted at the last Academia. Who won the race?

Share the following information with students:

"In the last Academia lesson, we wanted to see whether large and small cans roll at the same speed. To do this, each cooperative learning team ran four tests (four races), but is four races enough? Scientists do tests over and over again to check their predictions, and to make sure that ***observed results*** are correct before stating any ***conclusions***. Can anyone think of a way to check their team's ***observed results***? [Allow for responses.]"

Instead of each team doing more tests, each team can compare its results with the results of the other teams. In this way the class can see if there is a real winner — if small cans or large cans roll faster.

Diálogo dirigido

"En la última lección, queríamos ver si las latas grandes y las pequeñas ruedan a la misma velocidad. Para investigar esto, cada equipo hizo cuatro pruebas (cuatro carreras), pero ¿serán suficientes cuatro carreras? Los científicos hacen sus pruebas muchas veces para comprobar sus predicciones y para estar seguros de que los resultados que observan sean correctos antes de sacar cualquier conclusión. ¿Alguien piensa que hay alguna manera diferente de comprobar los resultados que observó su equipo? [Deje que contesten]".

Did We Get a Winner? (25 minutes)

In cooperative learning teams, students will complete their "Roller Derby Charts" to determine if the small or large can won in the class. Display the enlarged copy of the "Roller Derby Chart," and tell students that you are going to record the results of the Roller Derby races conducted at the last Academia on this large chart. Tell students that they will also be recording the information on their own charts. Ask each team to report their results and record these results on the enlarged copy of the chart. Make sure that the team members of the team reporting do not re-record this information, but that all the other cooperative learning team members do. After students have recorded the results for the entire class, guide them to determine whether they have a winner:

"Now that your chart is complete and you have recorded the ***observed results** of many tests, we can test our predictions and determine whether the small can or the large can rolls faster. The chart we have completed is a record of which can won the races. When scientists test their predictions, they write down what happened so that they can check their predictions — just like we did."

"Now, look at the column that has the large can. If the large can rolled faster more often than the small can, there should be more marks in the column marked 'Large Can' than in the column marked 'Small Can.' If the small can rolled faster more often, then the column marked 'Small Can' should have many more marks in it than does the column marked 'Large Can.' Which column would have more marks if most of the races were ties?" [Allow time for students to respond and determine if they have a winner.]

¿Tenemos un ganador?

"Ahora que ya completaron su gráfica y han anotado los resultados observados de muchas pruebas, podemos comprobar nuestras predicciones y averiguar cuál lata rueda más rápido, la lata grande o la pequeña. La gráfica que hicimos es un registro de la lata que ganó las carreras. Cuando los científicos ponen a prueba sus predicciones, estos anotan todo lo que pasa para comprobar sus predicciones, así como lo hicimos nosotros".

"Ahora, vean la columna de la lata grande. Si la lata grande fue la más rápida, habrá más marcas en esta columna que en la que dice 'Lata pequeña'. Si la lata pequeña fue la más rápida, entonces en esa columna habrán más marcas que en la que dice 'Lata grande'. ¿En cuál columna habrían más marcas si la mayor parte de las carreras hubieran sido empates?" [Deles tiempo para responder y para que los alumnos puedan averiguar si hubo un ganador].

If one column is not clearly the winner, explain that this means the class cannot tell whether large or small cans rolls faster.

Share the following information with students:

"Sometimes scientists cannot decide about their predictions. What do you think scientists would do about their predictions if they could not tell one way or another about the speed of rolling small and large cans? They might do even more tests to see whether they could find the answer to the question, 'Do large cans roll faster than small cans?' Scientists would also make sure that there wasn't a problem with their experiment. What might have happened, for example, if one of the cans you were racing were dented? Or, if one of the 'starters' kept releasing the small can before the large can? Scientists have to look carefully at everything to be sure that the tests were as fair as possible before they can make any ****conclusions***. Sometimes, scientists think they have discovered something, but then they do further tests or experiments that have different results. If this happens, scientists may have to change their thinking."

Comparta la siguiente información con los estudiantes:

"A veces los científicos no pueden decidir sus predicciones. ¿Qué piensan ustedes que haría un científico si no pudiera comprobar qué lata rueda más rápido? Quizás harían más pruebas para ver si podrían responder a la pregunta '¿Las latas grandes ruedan más rápido que las pequeñas?' Los científicos también se aseguran de que no haya ningún problema con su experimento. Por ejemplo, ¿qué pasaría si una lata estuviera abollada? ¿O si uno de los 'arrancadores' siempre soltara la lata pequeña antes de la lata grande? Los científicos tienen que fijarse en todo cuidadosamente para asegurar que las pruebas hayan sido lo más justas posible, antes de sacar cualquier conclusión. A veces piensan que han descubierto algo, pero luego hacen más pruebas o experimentos con distintos resultados. Si esto sucede, puede que los científicos tengan que cambiar su manera de pensar".

Based on the class' ***observed results,** can we make a ***conclusion** about the experiment? Can we conclude that small cans roll faster than large cans or that large cans roll faster than small cans? The conclusion of any experiment should also state whether or not the observed result supports the original hypothesis. Discovering that your hypothesis is wrong is just as valuable as discovering that it is right! Thus, in this sense, scientific experiments are always successful, as long as we remember the importance of a fair test.

Team Wordbank Review (25 minutes)

Provide each team with its wordbank and each team member with a copy of Handout 7.1. Ask students to review the key terms and concepts they have been learning throughout this first unit, and add them to their wordbank as needed. After each team has had enough time to review the words, tell students that they will have an opportunity to demonstrate that their whole team has learned these important new words and concepts through a "Numbered Heads Together Word Quiz."

Numbered Heads Together Word Quiz

Have students in each team number off so that there is a number one, two, three, four, etc. in each team. Explain to students that you will ask a question, for example, "What is a prediction?" Give students a moment to think about the question and discuss it as a team. Then you will ask, "Is there a Number One who can answer this question?" Recognize the first hand you see and give that person a chance to answer the question. If it is a correct answer, award a point to his/her team. If the answer is incorrect, acknowledge the attempt and then ask if there is another "Number One" who can answer the question. Call out different numbers for different questions so that all students have the chance to respond. Keep track of team points on the board, and offer some kind of acknowledgement that they had the most points on the Numbered Heads Together Word Quiz.

Closing (5 minutes)

Let students know that, in the next lesson, they will have an opportunity to discover things about the world of animals, and that they may be able to answer some of the questions that they have had about certain animals. For example, how many students have ever wondered how animals talk to each other? How many students have wondered why birds have different beaks? Remind students that, by asking these questions and by trying to find the answers, they become scientists.

Extension Activity

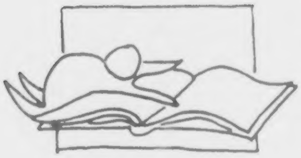
Invite students to write a series of ten questions on any or all school subjects, and then to write a second series of ten questions about the subject of the class. Then, in a third exercise, have them write about how to find the answers. For instance, what book or library would contain the information I need? If I don't know, whom could I ask? Where is the nearest bird sanctuary? What means of transportation do I use to get there? Can I call the public library or the natural history museum to find the answers to questions? Can I call a professor at a college or university? Can I call someone who works in a private business? Can I call or write the author of an article or book to get answers? Or even, how do I obtain the money to buy an expensive book I need? Finding answers often leads to further questions. Though the questions need not be answered, a further experiment could be to exchange questions and attempt to answer each other's, then to return them to the questioner for comment. If there is time, a "good summary writing" could involve the idea of the questions themselves: How do we know what we know? Can we know everything? Is it important to know the names of all things — rocks, minerals, fish, birds, mammals, stars, flowers, elements, trees, etc.? [This exercise is taken from Bernadette Mayer's "Epistemology" in Teachers & Writers.]

Parent Link

A learning, and fun family activity would be to have students try the first and second set of questions from the above exercise on their own, either at home or at Academia, and then to have them do the third set with their parents. Asking questions and brainstorming as a family can be a lot of fun, and gives adults an equal chance to be both teachers and students themselves. Particularly where it regards student questions about accessing resources and information in one's community; a family gains useful information and new ideas they can put to future use together.

Enlace familiar

Una actividad familiar divertida de aprendizaje que los alumnos pueden hacer en la casa o en Academia sería hacer preguntas del primer y segundo grupo de preguntas del ejercicio de arriba, después pueden probar el tercer grupo de preguntas con sus padres. Hacer preguntas y dar ideas entre famila puede ser muy divertido y da la aportunidad a las personas adultas de actuar como alumnos y maestros a la misma vez. Particularamente en lo que se refiere a las preguntas que un alumno hace acerca del acceso a recursos e información en su comunidad, una familia puede beneficiarse de esta información útil y de ideas nuevas que todos pueden usar juntos en el futuro.



Literature Link

June 29, 1999, written by David Wiesner, is a fun and imaginative story about experimentation and unpredictable results. While her third grade classmates are sprouting seeds in paper cups, Becky has a more ambitious, innovative science project in mind. Recommended for grades K-3.

110

Handout 7.1

Unit Review of Vocabulary

1. unique
2. diversity
3. consensus
4. observable
5. measurable
6. questionnaire
7. data
8. graph
9. experiment
10. predictions
11. hypothesis
12. fair test
13. observed result
14. conclusion

Hoja de trabajo 7.1

Repaso de vocabulario

1. único
2. diversidad
3. consenso
4. observable
5. mensurable
6. cuestionario
7. datos
8. gráfica
9. experimento
10. pronosticar
11. hipótesis
12. prueba válida
13. resultado observado
14. conclusión

Unit 2

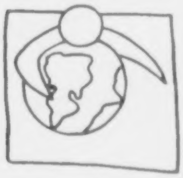
The World of Animals
El mundo de los animales

Introduction

This unit introduces students to the concept of animal behavior. How do animals survive in nature? How do animals communicate with one another? Students explore the differences and similarities between humans and the animals with whom we share the world. The concept of ***camouflage** and ***natural** selection is discussed in the first three lessons. Lesson 11 introduces the concept of animal ***adaptation** through a study of birds' beaks. Lessons 13 and 14 explore the topic of animal ***communication**. The last couple of lessons explore the concept of ***extinction**. In these, students also begin to understand the role they play in preserving animal life. For the purposes of these lessons, we have defined "animals" as nonhuman animals.

Introducción

Esta unidad le presenta a los alumnos el concepto de la conducta animal — ¿cómo sobreviven los animales en la naturaleza? ¿Cómo se comunican los animales entre sí ? Los alumnos contemplan las diferencias y los parecidos entre los seres humanos y los animales con que compartimos el mundo. En las tres primeras lecciones se presentan los conceptos del ***camuflaje** y de la ***selección natural**. La Lección 11 presenta el concepto de la ***adaptación animal** por medio del estudio de los picos de las aves. Las Lecciones 13 y 14 examinan el tema de la ***comunicación** entre los animales. La conducta ***innata** permite que algunos animales transmitan mensajes a sus crías o parejas. En las últimas dos lecciones se explora el tema de la ***extinción**. En estas lecciones, los alumnos comienzan a comprender el papel que juegan en la conservación de la vida animal. Como nota a esta unidad, para el propósito de estas lecciones hemos definido "animales" como animales no-humanos.



Overview

Lesson 8: Camouflaged Critters (Part I)

In this lesson students begin to learn about how animals survive in nature. They explore camouflage as a form of protection, and begin to understand the importance of ***natural habitat**.

Lesson 9: Camouflaged Critters (Part II)

This lesson continues the discussion of how animals protect themselves. It reinforces the important relationship between an animal's habitat and its way of "masking" or camouflaging itself.

Lesson 10: Camouflaged Critters (Part III)

In this lesson, students begin to explore the relationship between camouflage, protection, and survival. As they increase their knowledge of animal behavior, they begin to understand the complex topic of natural selection.

Lesson 11: Breakfast for the Birds

Students learn about adaptation through a study of birds' beaks, and continue to explore the important relationship between an animal's behavior and its habitat.

Lesson 12: Beaks, Bills, and Purpose

Working in their cooperative learning groups, students deepen their knowledge about camouflage, natural selection, and adaptation. Students design a beak of their own to fulfill a particular task.

Lesson 13: Sensory Signals (Part I)

In this lesson, students expand their knowledge of animal behavior. They learn how animals are able to send important messages via scent signals. This lesson emphasizes the relationship between animal behavior and animal survival.

Lesson 14: Sensory Signals (Part II)

This lesson continues to explore how animals communicate, focusing on sound as a means of animal communication. Students apply this knowledge of animal behavior through an activity that demonstrates how sound mechanisms are used for survival.

Lesson 15: Paradise Paved

Additional life science vocabulary is introduced in this lesson. Students discover the basic needs of both animals and humans and what can happen when deprivation occurs. In particular, this lesson examines how humans can play a role in destroying an animal's habitat and destroying its means of survival.

Lesson 16: Going to Bat for Animals

This lesson deepens student awareness of animal extinction. It encourages students to contemplate the importance of an animal's habitat, its preservation, and how people are involved in determining the fate of many endangered animals.

Lesson 17: Who Will Survive?

In this lesson, students review concepts learned throughout the unit. Working in their cooperative learning teams, they use the skills they have acquired in a game entitled "Who will survive?"

Resumen

Lección 8: Criaturas en camuflaje (Parte I)

En esta lección, los alumnos empiezan a aprender sobre cómo los animales sobreviven en la naturaleza. Al explorar el "camuflaje" de los animales como una forma de protección, comienzan a darse cuenta de la importancia del ***habitat natural.**

Lección 9: Criaturas en camuflaje (Parte II)

En esta lección los alumnos siguen estudiando cómo los animales se protegen disfrazándose. Se refuerza la relación importante entre el habitat del animal y su manera de disfrazarse.

Lección 10: Criaturas en camuflaje (Parte III)

En esta lección los alumnos empiezan a explorar la relación entre el camuflaje, la protección, y la supervivencia. Al aumentar su conocimiento de la conducta animal, empiezan a comprender el complejo tema de la ***selección natural.**

Lección 11: El desayuno para los pájaros

Al estudiar los picos de las aves, los alumnos estudian la adaptación animal. Siguen explorando la relación importante entre la conducta de un animal y su hábitat.

Lección 12: Picos y funciones

Trabajando en sus equipos de aprendizaje cooperativo, los alumnos siguen estudiando el camuflaje, la selección natural y la adaptación. Cada alumno diseña su propio pico para cumplir con una función especial.

Lección 13: Señales sensoriales (Parte I)

En esta lección los alumnos aumentan su conocimiento de la conducta animal. Aprenden cómo los animales mandan mensajes importantes por medio del sentido del olfato. Esta lección enfatiza la relación entre la conducta animal y la supervivencia.

Lección 14: Señales sensoriales (Parte II)

Esta lección sigue investigando cómo se comunican los animales, ahora enfocándose hacia el sonido. Los alumnos aplican sus conocimientos de la conducta animal en una actividad que demuestra cómo los animales se valen de los mecanismos de sonido para sobrevivir.

Lección 15: El paraíso pavimentado

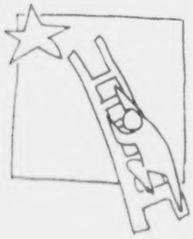
En esta lección se aumenta el vocabulario de ciencias generales. Los alumnos descubren las necesidades básicas de los animales y los humanos y lo que puede resultar de la carencia. De una manera especial, esta lección investiga el papel que juegan los humanos al destruir el hábitat de un animal y sus medios de supervivencia.

Lección 16: Saliendo en defensa de los animales

Esta lección concientiza a los alumnos sobre la extinción animal. Los incentiva a contemplar la importancia del hábitat de un animal, su conservación y cómo los humanos están involucrados en decidir el futuro de muchos animales que están en peligro de extinción.

Lección 17: ¿Quién sobrevivirá?

En esta lección los alumnos repasan varios conceptos que han aprendido a través de esta unidad. Trabajando en sus equipos de aprendizaje cooperativo, utilizan las destrezas que han adquirido en un juego llamado ¿Quién sobrevivirá?



Objectives

By the end of this unit, students will be able to:

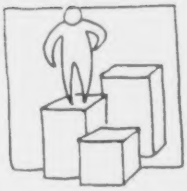
1. Understand and define the life science vocabulary introduced in this unit.
2. Understand some of the mechanisms that allow animals to protect themselves and survive in nature.
3. Write about the complex concept of natural selection.
4. Describe the relationship between beak shape and size, and the type of food a bird eats.
5. Graph data.
6. Provide evidence for decision-making.
7. Understand differences in verbal and non-verbal communication.
8. Discuss the importance of communication for both animal and human survival.
9. Identify the five basic survival needs of both animals and humans.
10. Understand that human behavior and activities can impact the survival of animals and humans.
11. Provide examples of animals that are currently in danger of extinction.

Objetivos

Al terminar la unidad, los alumnos podrán:

1. Comprender y definir el vocabulario de ciencias generales que se presenta en esta unidad.
2. Comprender algunos de los mecanismos que le permiten a los animales protegerse a sí mismos y sobrevivir en la naturaleza.
3. Escribir sobre el complejo concepto de la selección natural.
4. Describir la relación entre la forma y tamaño del pico de un ave y su alimento.

5. Hacer una gráfica utilizando datos.
6. Presentar evidencia para tomar decisiones.
7. Comprender las diferencias entre la comunicación verbal y la no-verbal.
8. Discutir la importancia de la comunicación para la supervivencia animal y humana.
9. Identificar las cinco necesidades básicas para la supervivencia animal y humana.
10. Comprender que la conducta y las actividades humanas pueden impactar la supervivencia de los animales.
11. Citar ejemplos de animales que actualmente esten en peligro de extinción.



Operating Grade Level

All the lessons in this unit are appropriate for grades three through five. As you go through the unit and get to know your students, review the content of each lesson to see if it is appropriate for your particular group, and make the necessary adjustments.

Nivel o grado

Todas las lecciones de esta unidad son apropiadas para los grados 3-5. A medida que va repasando la unidad y conociendo las necesidades y capacidades de sus alumnos, revise el contenido de cada lección para ver si es apropiada para los alumnos de su grupo en particular y haga los cambios necesarios.

Suggested Quote/Cita sugerida

The following quote, or one of your choosing, may be useful to initiate or continue discussions about ideas that are important in this unit and these lessons.

The endangered are not species.
The endangered is "beauty,"
Unfrozen.

—Bernice Zamora, as quoted in *The Fire in Our Souls*

Ms. Zamora is a Chicana poet whose collection *Restless Serpents* is one of the seminal works of Chicana poetry.

Lo que está en peligro de extinción no son las especies. Lo que está en peligro de extinción es la "belleza" natural.

—Bernice Zamora

You may want to do the following with the quote:

☆ Introduce quote to students.

☆ Ask students to write it on newsprint and place it in a visible place such as the wall.

☆ Talk about the author.

☆ Brainstorm possible meanings and ways in which those meanings apply to the unit and to the lives of students, their families or communities.

☆ Ask students if the quote reminds them of something their parents, grandparents, or other family members would have said or agreed with.

☆ Ask students to re-state the quote in their own words (individually or in a group).

☆ Look for opportunities to relate the quote to language arts activities or to "Our Creative World" activities in work stations.

☆ Create a class "quote file" to which students can add quotes from this curriculum and those that parents, grandparents, or other family members may share with them during the course of Academia.

☆ Ask students and adults to send in favorite sayings or proverbs of friends or family members, lyrics from songs, passages from books, or original contributions that relate to math and science and nature or the environment, or to themes like perseverance, courage, determination, inspiration, identity, uniqueness, or diversity.

Usted podría hacer lo siguiente con la cita:

☆ Introducir la cita a los alumnos.

☆ Pedir a los alumnos que escriban la cita en un papel grande y que la pongan en un lugar visible como la pared.

☆ Repasar posibles significados y formas en las que estos significados puedan ser aplicables a la unidad y la vida de los estudiantes, sus familias o comunidades.

☆ Preguntar a los alumnos si esta cita les recuerda de algo que sus padres, abuelos, u otros familiares les hayan dicho o con lo que estos están de acuerdo.

☆ Pedir a los alumnos que vuelvan a plantear la cita en sus propias palabras (individualmente o en grupo).

☆ Buscar oportunidades para relacionar la cita con las actividades de lenguaje o las actividades de "Nuestro mundo creativo" en los centros de trabajo.

☆ Crear un "archivo de citas" de la clase al cual los alumnos puedan añadir citas de este manual y esas que los padres, abuelos u otros miembros de la familia puedan compartir con ellos durante el curso de la Academia.

☆ Pedir a los alumnos y personas adultas que manden sus dichos favoritos o proverbios de sus amigos o familiares, letra de canciones, pasajes de libros, contribuciones originales, que estén relacionados con ciencias o las matemáticas, la naturaleza o el medio ambiente, o a temas como perseverancia,valentía, determinación, inspiración, identidad, singularidad o diversidad.

Cultural Link

Birds are important symbols in Latin America. The eagle, the quetzal, and the condor are national symbols in some countries. As an activity, have students look up the national flags and coats of arms of different Latin American countries in search of bird symbols. They can research and share facts about these birds, and display them next to drawings of the flags or coats of arms. A creative link, as an extension of this activity, could involve an observation project where students document birds in the communities the class represents, research facts about them, and using consensus, choose birds to create representations they can use in making an Academia flag — one bird alone can be chosen for the flag for its meaning to the class, or one bird from each of the communities can be used to represent everyone.

Enlace cultural

Los pájaros en Latino América son símbolos muy importantes. El águila, el quetzal y el condor son símbolos nacionales en algunos paises. Como una actividad, y los alumnos pueden buscar símbolos de pájaros en banderas nacionales y escudos de armas de diferentes paises de Latino América. Ellos pueden investigar y compartir datos acerca de estos pájaros y exhibirlos al lado de los dibujos de las banderas y escudos de armas. Un enlace creativo como extensión a esta actividad puede ser un proyecto de observación donde los alumnos reunen información acerca de los pájaros que representan a las comunidades de la clase, investigan datos y, usando consenso, escogen pájaros para representarlos en la bandera de la Academia — pueden escoger un solo pájaro para la bandera por el significado que tiene para la clase entera o un pájaro que represente a cada una de las comunidades de la clase.

Parent Link

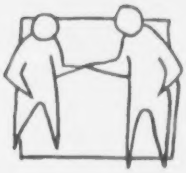
Parent Links attempt to help make meaningful connections between what students learn in school and the world around them. In this unit, students learn about how animals behave, communicate, and survive in nature. Parent Links involve the family in this sense of wonderment, discovery, and exploration of the similarities and differences between animals and human beings.

Encourage students to write, draw, or talk about what they learned from their parents in the previous lesson's Parent Link during the Daily Homework/ Learning Option. Whenever possible, collect students' writing, drawings, or projects to share at the PAP meetings, to display on a bulletin board at the end of the unit, or to be acknowledged in other ways.

Enlace familiar

El intento del enlace es hacer una conección significativa entre lo que los estudiantes aprenden en la escuela y el mundo que los rodea. En ésta unidad los alumnos aprenden acerca del comportamiento animal, la comunicación y la supervivencia de estos en la naturaleza. El enlace familiar involucra a la familia con un sentido de curiosidad, descubrimiento y exploración de las semejanzas y las diferencias entre los animales y los seres humanos.

Anime a los estudiantes a escribir, dibujar o hablar acerca de lo que han aprendido de sus padres en los enlaces familiares de las lecciones previas durante la opción de tarea para la casa. Siempre que sea posible, recoja las redacciones, dibujos o proyectos de los estudiantes para compartirlos en la reunión de padres, exhibirlos en el tablero de anuncios al final de la unidad o para que sean reconocidos de otras maneras.



Parents as Partners (PAP) Link

This is the second meeting of the Parents as Partners component of the program. During the first meeting, parents were given an orientation to the program and began to connect names to faces among program staff, and to meet other parents. This second PAP meeting should create the opportunity to build relationships between staff and parents, and to tend to unfinished business from the previous meeting. We suggest making this meeting a social activity centered around a pot-luck dinner and a presentation by Academia students. [Please refer to the *Parents as Partners Guide* for ideas and suggestions on the types of activities that might emerge within your own organization and the ADP-MAS program.] Depending on the month during which this second meeting is held, the program teachers and students can select a cultural theme that is appropriate.

If it is October, for example, the theme could incorporate October 12, Dia de la Raza, a celebration of the merging of the European, Asian, African, and indigenous worlds to create a new culture. Invite someone to make a brief (perhaps 10-minute) presentation on the importance of cultural pride to children's self-esteem, and the role of parents in passing on cultural and historical information to their children.

With regard to a student presentation, you may want to use this meeting as an opportunity for children to present the "Family Acrostic" poems about their family's "uniqueness" written as part of Lesson 2's Parent Link. Students may also share their own acrostics, the results of the "24 Hours at My Family's House" exercise, or any of the work resulting from extensions.

As a part of every PAP meeting, be sure to introduce the upcoming unit topics, discuss the parent links, and give parents an opportunity to shape the direction of the lessons ahead.

Suggested resources for this meeting are:

- A meeting agenda.
- A resource person to speak about cultural pride as it relates to children's self-esteem, or another appropriate theme.
- Project PRISM handout "Learning Science and Math in Your Community."
- Updates to program calendar (holidays, closings, field trips, etc.).
- Description of upcoming unit topics, lessons, objectives, and Parent Links.

Reunión de padres

Esta es la segunda reunión de padres del programa. Durante la primera reunión los padres recibierón una orientación sobre el programa y comenzaron a conectar los nombres con las caras del personal y conocer a otros padres. Esta segunda reunión de padres crea la oportunidad para desarrollar un relación entre los padres y el personal. Se sugiere hacer esta reunión y la presentación de los estudiantes como una actividad social alrededor de una cena que los padres podrían traer de sus casas para compartir. [Refiérase a la *Guía para padres* para obtener ideas y sugerencias para el tipo de actividades que puedan surgir dentro de su propia organización y el programa de ADP-MAS.] Dependiendo del mes en el cual se realiza la reunión, los maestros del programa y los alumnos pueden escoger un tema cultural que sea apropiado a ese més.

Si es el més de octubre, por ejemplo, el tema a incorporase podría ser el 12 de octubre, Día de la Raza, una celebración de la unión del mundo de los europeos, asiáticos, africanos e indígenas para crear una nueva cultura. Invite a una persona para que haga una presentación pequeña (quizás por unos 10 minutos) sobre cómo el orgullo cultural afecta el auto-estima y el papel que tienen los padres de proveer a sus hijos información cultural e histórica.

Con respecto a la presentación de los alumnos, podrían usar ésta reunión como una oportunidad para que ellos presenten el "acróstico familiar" que escribieron acerca de la "singularidad" de sus familias como parte de los enlaces familiares

de la Lección 2 de la Unidad 1. Los alumnos también pueden compartir sus propios acrósticos, el resultado del ejercicio de las "24 horas en la casa de mi familia" o cualquier otro trabajo que venga de las extensiones. Como parte de cada reunión de padres asegúrese de introducir los temas de la próxima unidad, converse acerca los enlaces familiares y dé a estos la oportunidad de dirigir las lecciones que vienen.

Se sugieren los siguientes recursos para ésta reunión:

- ☆ Una agenda para la reunión.
- ☆ Una persona que pueda hablar sobre cómo el orgullo cultural está relacionado con el auto-estima de los niños, u otro tema apropiado.
- ☆ Hoja de trabajo del proyecto PRISM titulada "Aprendiendo ciencias y matemáticas en su comunidad".
- ☆ Poner al corriente el calendario del programa (feriados, cierres, excursiones, etc.)
- ☆ Descripción de los temas de las próximas unidades, lecciones, objetivos y enlaces familiares.

PAP Resource 2.1

Project PRISM's "Learning Math and Science in Your Community"

Do you know the old saying, "It takes a whole village to raise a child?" Parents are a child's first teachers, and home is the first science and math classroom. We count on schools to build a strong foundation in math and science, but there are also many other places, people, and programs outside the home and school that can add to what parents and teachers provide on a regular basis.

- ☆ **Think of your neighborhood as a science and math resource.** A tour of the factory or shop where a family member works and an insect hunt in the playground, park, or lot are examples of places to learn science. Think of the "hands-on" math problems you can make up at a busy intersection. How many vehicles go through the intersection each time the light is green? How long is the light green? Predict the number of vehicles that will go through that intersection in fifteen minutes or half an hour. Try to find out how close you came. Once you begin looking for ways to use your neighborhood as a place to learn science and math, you will discover more and more.
- ☆ **Find local businesses where students can get behind the scenes.** Students can talk with people who work there, and discover the uses of science and math. For example, the dry cleaner uses chemicals. What happens to the used chemicals? How do chemicals remove stains? The grocer sells food. How are fruits, vegetables, and meat kept fresh? Is there some kind of inspection process? What happens to food after the expiration date? How much of the price of each item is profit? What expenses are there for the grocery store owner?
- ☆ **Use buildings in your community to teach science and math concepts.** Discover what materials the buildings in your community are made of. Wood? Concrete? Adobe? Brick? Granite? Sandstone? Steel? Glass? Explore reasons for using these materials. Buildings can provide lots of math activities. A young child can copy a building using blocks. Older students can estimate, count, and measure windows, doors, stairs, floors, and the many other features of buildings. Buildings provide homes for animals besides people! Go on a hunt for insects, birds, or other animals that live in and around buildings in your community. You'll be surprised at how many you can find!
- ☆ **Discover what happens to waste and trash in your community.** Where does the sewage go when it leaves your home? Does your community have a recycling program? What materials are collected for recycling? Why aren't more things recycled? See if there is a landfill you could arrange to take a group of children to visit. Perhaps your family can start a recycling project at home or in the neighborhood.
- ☆ **Find out where drinking water comes from in your community and how it is kept safe to drink.** Contact your local department of public works or the town or city hall for help in getting this information. Once you find out where the water comes from, get out a map and locate the reservoir, river, or water treatment plant. Find out if there is a water treatment facility you could visit. Does the water in the fire hydrants come from the same place? How does a hydrant work?

Parents as Partners Resource 2.1 (Cont.)

☆ **Make and use maps.** Making a map of a room in your home involves measuring and geometry. When you choose shapes to represent furniture, windows, or doors, you are using symbols. These are important mathematical ideas. Making a map of the neighborhood can be a good family project. At the same time you use math, you can learn more about what is in your neighborhood. Learning to use a map of your community can help you locate places where your children can learn science and math such as the library, community organizations, parks, and churches. Once you know where these places are, you can figure out how to get to them and use them.

☆ **Visit science and technology museums in your community.** Here you and your children can have fun and learn science and math together. Many museums have special areas, exhibits, and programs just for children where students can learn in a "hands-on" way. They can use equipment that most schools do not have the money, space, or technical expertise to own. To find museums, look in the Yellow Pages, ask at the public library or call your local chamber of commerce. You can phone museums to find out hours, how to get there by public transportation, and entrance costs. Many museums that charge entrance fees have certain times of day or days of the week when people are admitted free.

☆ **Seek out science and math programs in youth organizations, churches, parks, schools, and colleges and sign up.** Many community organizations have incorporated science and math activities into their youth programs. Look for announcements on bulletin boards in your school, library, church, and community center. Some of the youth organizations, such as the Urban League, 4-H, Girl Scouts, etc., have special summer camps. Phone them to ask. Programs that focus on math and science often contact guidance counselors or science and math teachers at local schools. Ask these teachers and counselors if they can recommend any programs. If programs charge fees, be sure to ask about scholarships or other financial assistance if you need to.

☆ **Use your local public library.** Libraries have many resources for families interested in math and science education. Librarians are there to help. You and your children should ask for any help you need to find interesting materials at the right reading level or videos and tapes that focus on science and math.

☆ **Recognize that one person can make a difference.** A neighbor who is a mechanic and helps boys and girls learn how to tinker and repair bicycles or cars can spark a young person's interest. A mother who organizes other parents to take children to parks and museums on a regular basis can make a difference. Sometimes an informal neighborhood activity gets so popular that it has to move to a community center and hire staff to run its program. Many successful science and math activities start with one person's good idea an willingness to carry it through.

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* Excerpted from Project PRISM, a program of the National Urban League, Inc., in association with the National Council of La Raza, The NETWORK, Inc., and Thirteen/WNET, sponsored by the Science and Math Project of the Annenberg/CPB.

Recurso para reunión de padres 2.1

"Aprendiendo ciencia y matématicas en su comunidad" del Proyecto PRISM*

¿Conoce el dicho que dice, "Se necesita a todo un pueblo para criar a un niño"? Los padres son los primeros maestros de un niño y el hogar es el primer salón de ciencia y matemática. Contamos con las escuelas para crear una base fuerte en matemática y ciencia para los niños pero también hay muchos lugares, gente y programas fuera del hogar y de la escuela que pueden agregar a lo que los padres y maestros proveen regularmente.

☆ **Piense en su comunidad como un buen recurso para la ciencia y matemática.** Un paseo por la fábrica o tienda donde un miembro de la familia trabaja y una búsqueda de insectos en el patio de recreo, en el parque o en un lote son ejemplos de lugares para aprender ciencia. Piense en los problemas prácticos de matemática que usted puede crear mientras espera en tráfico. ¿Cuántos carros pasan por la intersección cada vez que la luz se pone verde? ¿Cuanto tiempo dura la luz verde? Pronostique cuantos carros pasarán cada quince minutos o cada media hora. Trate de averiguar que tan cerca estuvo. Una vez que empiece a buscar maneras para usar su comunidad como un lugar para aprender ciencia y matemática, usted descubrirá más y más.

☆ **Busque negocios locales donde los estudiantes pueden estar detrás de las escenas.** Los estudiantes pueden platicar con personas que trabajan allí y descubrir los usos de la ciencia y la matemática. Por ejemplo, un tintorero usa químicos. ¿Qué les pasa a los químicos usados? ¿Cómo es que los químicos remueven las manchas? El avacero o almacenero vende comida. ¿Cómo mantienen las frutas, vegetales y la carne fresca? ¿Hay algún proceso de inspección? ¿Qué pasa con la comida después de la fecha de expiración? ¿Qué monto del precio de cada artículo es ganancia? ¿Qué gastos hay para el dueño de la tienda de verduras?

☆ **Use edificios en su comunidad para la enseñanza de los conceptos de ciencia y matemática.** Descubra de qué materiales están hechos los edificios en su comunidad. ¿Madera? ¿Concreto? ¿Adobe? ¿Ladrillo? ¿Granito? ¿Arenisca? ¿Acero? ¿Vidrio? Averigüe las razones para usar estos materiales. Los edificios pueden crear muchas actividades para la matemática. Un niño puede copiar un edificio usando bloques. Los estudiantes más grandes pueden calcular, contar y medir ventanas, puertas, escaleras, pisos y muchas otras facciones de los edificios. ¡Los edificios también pueden servir de hogar a animales no solamente a los humanos! Busque insectos, pájaros, u otros animales dentro o afuera de los edificios en su comunidad. ¡Se sorprenderá en cuantos puede encontrar!

☆ **Averigüe que ocurre con el desperdicio y basura en su comunidad.** ¿A dónde se van la aguas negras después de que salen de su casa? ¿Tiene su comunidad un programa de reciclar? ¿Qué materiales se usan para reciclar? ¿Por qué no se logra reciclar más cosas? Vea si hay un basurero donde usted pueda llevar a un grupo de niños. A lo mejor su familia puede empezar un proyecto de reciclaje en casa o en su comunidad.

☆ **Investigue de donde viene el agua para tomar y como la mantienen limpia.** Póngase en contacto con el departamento de trabajos públicos local o con la municipalidad para que le ayuden a obtener esta

Recurso para reunión de padres 2.1 (cont.)

información. Una vez que sepa de donde viene el agua, saque un mapa y localize el depósito, el río, o la planta de tratamiento de agua. Investigue donde hay una planta de tratamiento de agua que puedan visitar. ¿Viene del mismo lugar el agua de las bocas de incendio? ¿Cómo trabaja una boca de agua para incendios?

☆ **Haga y use mapas.** El hacer un mapa de un cuarto en su casa requiere medir y usar conceptos de geometría. Cuando escoge figuras para representar muebles, ventanas o puertas, está usando símbolos. Estas son ideas de matemática importantes. El hacer un mapa de la vecindad puede ser un buen proyecto familiar, a la misma vez que usa la matemática también puede aprender más sobre su vecindad. Aprender a usar un mapa de su comunidad le puede ayudar a localizar lugares donde su hijo puede aprender ciencia y matemática, como la biblioteca,organizaciones comunitarias, parques o iglesias. Una vez que sepa en donde están estos lugares, usted puede averiguar como llegar a ellos y como usarlos.

☆ **Visite museos de ciencia y tecnología en su comunidad.** Aquí usted y su hijo pueden divertirse y aprender ciencia y matemática juntos. Muchos museos tienen areas especiales, exhibiciones, y programas solamente para niños donde los estudiantes pueden trabajar en actividades en maneras que les dan la oportunidad de obtener la experiencia através de hacer un proyecto. Pueden usar equipos que muchas escuelas no tienen el dinero, espacio o experiencia técnica para comprar. Para buscar los museos, mire en las páginas amarillas, pregúntele a bibliotecas públicas o llame a la cámara de comercio. Puede llamar al museo para saber el horario, como llegar allí en transporte público, y cuanto cuesta la entrada. Muchos museos que cobran para entrar tienen horas o días cuando se puede entrar gratis.

☆ **Busque programas de ciencia y matemática en las organizaciones de jóvenes, iglesias, parques, escuelas y colegios, e inscríbase**. Muchas organizaciones comunitarias han incorporado actividades de ciencia y matemática en sus programas para jóvenes. Busque anuncios en los boletines de las escuelas, bibliotecas, iglesias y centros comunitarios. Algunas organizaciones comunitarias , como Urban League, 4-H, Girls Scouts, etc., tienen campos de verano; llámeles y pregúnteles. Programas que se enfocan en la ciencia y la matemática muchas veces contactan a los consejeros escolares o maestros de ciencia y matemáticas. Pregúntele a estos maestros si pueden recomendar algún programa. Si los programas cobran por entrar, asegúrese de preguntar si ofrecen becas u otra asistencia financiera si la necesita.

☆ **Use su biblioteca pública local.** Las bibliotecas tienen muchos recursos para familias que están interesadas en la educación de la ciencia y la matemática. Los bibliotecarios le pueden ayudar. Usted y sus hijos deben pedir la ayuda que necesiten para encontrar materiales al nivel correcto o videos y grabaciones cuyo enfoque sea la ciencia y la matemática.

☆ **Reconozca que una persona puede tener mucho impacto.** Un vecino que es un mecánico y ayuda a los niños y niñas a cómo reparar bicicletas y carros puede incitar el interés de un niño jóven. Una madre que organiza a otros padres para llevar a los niños a los parques y museos regularmente puede

Recurso para reunión de padres 2.1 (cont.)

hacer una gran diferencia. A veces una actividad informal en la vecindad puede convertirse en algo muy popular que se tiene que mover a un centro comunitario y emplear a personas para manejar el programa. Muchas actividades exitosas de ciencia y matemática empiezan con una buena idea de una persona y las ganas de sacarlo adelante.

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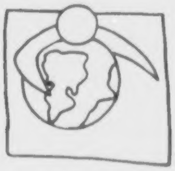
* Fragmento tomado de hoja de trabajo producida por el Proyecto PRISM, un programa del National Urban League, Inc., en asociación con el Consejo Nacional de La Raza, The NETWORK, Inc., y Thirteen/WNET, patrocinado por el Proyecto de Ciencia y Matemáticas del Annenberg/CPB

Lesson 8

Camouflaged Critters (Part I)
Criaturas en camuflaje (Parte I)



Overview

In this lesson students begin to learn how animals survive in nature. They explore camouflage as a form of protection, and begin to understand the importance of ***natural habitat**. This lesson, as well as Lessons 9 and 10, use activities which were developed by the National Science Foundation for National Science and Technology Week.

Resumen

En esta lección, los alumnos empiezan a aprender cómo sobreviven los animales en la naturaleza. Al explorar el "camuflaje" como una forma de protección, comienzan a apreciar la importancia del ***habitat natural**. Esta lección y las Lecciones 9 y 10 utilizan actividades desarrolladas por el National Science Foundation para la Semana Nacional de Ciencia y Tecnología.

Key Skills

Observing
Inferring
Comparing
Writing

Destrezas claves

Observar
Hacer inferencias
Comparar
Redactar

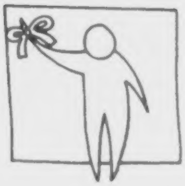
Preplanning

1. Remember to ask students to bring in toilet tissue tubes for next lesson.
2. Duplicate and cut paper lizard strips.
3. Just before the activity, brightly color 3-cm lengths of masking tape (one per child, plus a few extras). While students are out of the room, stick each piece of tape on a contrasting background somewhere in the classroom.

4. At the same time, color a 3-cm length of masking tape to match the upper part of your shoe. Stick the tape on the top or side of your shoe.
5. Read "Background for the Teacher" and review the following terminology:

**camouflage*	**camuflaje*
**habitat*	**hábitat*
**natural selection*	**selección natural*

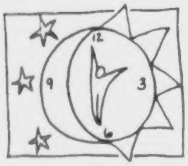
Background for the Teacher



Camouflage is an important element in a deadly form of hide-and-seek between predators and prey. Since children usually enjoy playing hide-and-seek, they can relate eagerly to what they perceive as a similar game in the natural world of animals. However, in the game of hide-and- seek, children hide "on purpose." Even the words "hide-and-seek" denote purposeful action. In teaching science concepts, we sometimes unconsciously promote teleological explanations; that is, we attribute deliberate purpose to nonhuman organisms or to natural events. Animal camouflage is often presented in this manner, as though animals purposefully planned their natural coloring or markings. Actually, animal camouflage has evolved through the process of ***natural selection**, without conscious effort by animals. This inherited characteristic of camouflage enables organisms and their offspring to survive.

Información para el/la maestro/a:

El camuflaje es un elemento importante en un juego mortal de escondidas entre un animal y su presa. Como a los niños les gusta jugar a las escondidas, pueden entender fácilmente lo que perciben como un juego parecido en el mundo natural de los animales. Pero en el juego de las escondidas, los niños se esconden "a propósito". El hecho de esconderse y buscarse es una acción voluntaria. Al enseñar conceptos de ciencias, a veces inconscientemente damos explicaciones teleológicas, es decir, que atribuímos un propósito a los organismos no-humanos o a los eventos naturales. El camuflaje animal muchas veces se presenta de esta manera, como si los animales conscientemente planearan su coloración natural. En realidad, el camuflaje de los animales ha evolucionado por un proceso de selección natural, sin ningún esfuerzo consciente de su parte. Este camuflaje heredado permite que sobrevivan los organismos y sus crías.



Suggested Time

10 minutes—Welcoming
45 minutes—Homework/Learning Options
10 minutes—Hide-and-Seek
15 minutes—Guided Discussion
20 minutes—Lizard Strips
10 minutes—Journal
10 minutes—Closing

2 hours total

Materials

A teacher can conduct this lesson alone, if necessary. Because the group will be divided into two during the second activity, a teaching assistant would be very helpful. In addition, you'll need the materials listed:

- Masking tape.
- Magic markers and crayons.
- Handout 8.1, "Lizard Strip Pattern" (one lizard strip per child).
- Photographs or pictures of camouflaged animals.
- A picture of a chameleon.

Suggested Quote/Cita sugerida

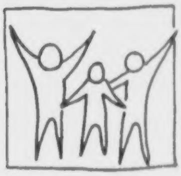
The endangered are not species.
The endangered is "beauty,"
unfrozen.

—Bernice Zamora, as quoted in *The Fire in Our Souls*

Ms. Zamora is a Chicana poet whose collection *Restless Serpents* is one of the seminal works of Chicana poetry.

Lo que está en peligro de extinción no son las especies. Lo que está en peligro de extinción es la "belleza" natural.

—Bernice Zamora



Welcoming (10 minutes)

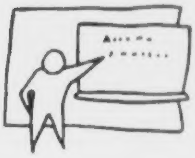
Welcome students and take attendance. Some students should be asked to chart the day's attendance on the class attendance chart. Others should chart the weather or temperature.

Tell students that they will be spending the next couple of weeks studying the way animals live and survive in the great outdoors.

Ask students if they have ever wondered what it would be like if they lived in the woods or in a forest. Would they be afraid of other animals? How would they protect themselves from the cold? How would they protect themselves from other animals that might harm them? As human beings, we would use tools to construct houses to protect ourselves, but what do other animals do? Tell students that they will explore these questions in this unit.

Homework/Learning Options (45 minutes)

Students may use this time to complete their school work or to receive individualized tutoring.



Curriculum

Hide-and-Seek (15 minutes)

Ask students if they know how to play "Hide-and-Seek," and if they know what the word "seek" means.

Tell them:

"You are going to 'seek,' or look, for small strips of colored tape that I have hidden in the classroom." [Show the students one of the strips.] Each one of you should try to find one strip and take it to the board and tape it there."

At the end of three minutes, ask:

"Were your strips easy or hard to find? Why?" [They should have been easy to find because the color of the strips was of a different color than the background.]

If they have not already found them, tell them:

"There is another colored strip, located somewhere on me, that you have not found yet. Can you find it?"

When the children locate the strip on your shoe ask them:

"Why was this strip so much harder to find?"

Escondidas

Diga a los alumnos:

"Van a buscar unas tiritas de cinta de colores que están escondidas en el salón. Cada uno de ustedes va a tratar de encontrar una cinta y a pegarla en el pizarrón".

"¿Fué fácil o difícil encontrar las cintas? ¿Porqué?"

"Hay otra cinta en mi persona que todavía no han encontrado. ¿La pueden encontrar?"

"¿Porqué fue más difícil encontrar esta cinta?"

Guided Discussion (15 minutes)

Tell students that they play "Hide-and-Seek" for fun. Ask them if they think animals do this for fun.

Ask students:

"Why do you think animals hide?" [To catch prey or to hide from predators.]

"Why do you think animals are colored to match their surroundings?" [So that they won't be seen and then eaten by other animals.]

"There is another word that means an animal's surroundings. This word is ***habitat**. An animal's habitat is the area in which an animal (or plant) is naturally found. Many animals are colored to match their habitat or surroundings, and are not easily seen. Do you know a special word for 'matching the surroundings or matching the habitat'?" [The word is ***camouflage**.]

Tell students:

"Camouflage is a kind of disguise. Have you seen how military men and women dress in camouflage? Or hunters? Although their special colors help protect them in their native habitat, animals don't plan camouflage colors."

Show students the pictures you have collected of animals that match their surroundings. Ask students if they know of any animal that is able to change its colors to match its surroundings. They might know that chameleons can change colors and patterns to blend in with their backgrounds. Tell them that chameleons do not live in the United States, except in zoos and special places. Show students a picture of a chameleon if available.

Diálogo dirigido

"Ustedes juegan a las escondidillas para divertirse. ¿Creen que los animales también lo hacen para divertirse?"

"¿Porqué creen que los animales se esconden?" [Para atrapar a su presa, o esconderse de algún animal que se los quiera comer.]

"¿Porqué creen que algunos animales son del mismo color que su alrededor? [Para que otro animal no los vea y se los coma]".

" Hay otra palabra que significa lo mismo que los alrededores de un animal. Esta palabra es ***Hábitat.** El hábitat de un animal es el área en donde naturalmente se encuentra el animal (o planta). Muchos animales son del mismo color que su hábitat, y no se pueden ver fácilmente.

¿Conocen una palabra especial que significa "mezclarse con los alrededores o mezclarse con el hábitat"? [La palabra es ***camuflaje.** El camuflaje es un tipo de disfraz. ¿Han visto cómo los militares o los cazadores se visten de camuflaje? Aunque sus colores especiales ayudan a los animales a protegerse en su hábitat natural, ellos no planean los colores de su camuflaje".

Lizard Strips (20 minutes)

Explain to students before the activity that they will each receive a plain paper lizard strip.

Tell students:

"You will look around (without telling anyone) and locate a 'habitat' for your lizards. Next, you will color your lizards to match your habitat. You will try to make them hard to see by using camouflage colors or colors that will make them difficult to be seen in the 'habitat' you have chosen. When you finish coloring the lizards you will place or tape your lizards in the habitat area. You cannot hide your lizard under, or inside, anything. [Demonstrate this, if necessary.]

Tiras de lagartija

"Van a explorar su salón y a localizar un 'hábitat' para sus lagartijas (sin decírselo a nadie). Luego de esto van a colorear sus lagartijas para que se mezclen con su hábitat. Tratarán de esconderlas por medio del uso de colores que hagan difícil que estas puedan ser vistas en el hábitat que escogieron. Cuando terminen de colorear las lagartijas las van a poner o pegar en el hábitat que escogieron. No pueden esconder sus lagartijas ni debajo ni dentro de ninguna cosa". [Demuestre esto si es necesario].

Allow all students about 5 minutes to color their lizards. When the class is done coloring their lizards, instruct half of the class to hide their lizards in their "habitat" while the rest of the class is in the hall or a nearby area. Show

the group pictures of camouflaged animals while they are waiting. When the first group has hidden their animals let the other group try to find them. Give them about 2 minutes to do this, then reverse the roles.

Guided Discussion (15 minutes)

Ask students:

"Which lizards were the hardest to find?" [The ones that were the best camouflaged with their surroundings.] "Would these be the ones most likely to catch flies and other insects? Why?" [Yes, because they would be well hidden and the fly or insect would not see the lizard.]

"Would the well-camouflaged lizards be more or less likely to be eaten by a snake? Why?" [In all cases, students should see that the well-camouflaged lizards would be more likely to find food and to survive capture from predators because they cannot be seen easily.]

Diálogo dirigido

Pregunte a los alumnos:

"¿Cuáles lagartijas fueron las más difíciles de encontrar?" [Las que tenían el mejor camuflaje.] ¿Serían estas lagartijas las más capaces de atrapar moscas y otros insectos? ¿Porqué?" [Sí, porque estarían mejor escondidas y ni las moscas ni los insectos las podrian ver].

"Las lagartijas con buen camuflaje, ¿estarían en más peligro de que se las comieran otros animales? ¿Porqué?" [En todos los casos, los alumnos deben ver que las lagartijas con buen camuflaje serían más capaces de encontrar alimento y escaparse de otros animales predatores, porque estos no se pueden ver fácilmente].

Journal (10 minutes)

Give students 10 minutes to sketch a picture of a camouflaged creature of their choice. In their journals, have them write an accompanying paragraph explaining how camouflage may help or not help both prey and predator survive. (If they are younger and unable to draw, provide pictures of camouflaged creatures they can cut out and paste onto their journals.) ***Animal Camouflage***, a Literature Link for this lesson, contains models students can use for drawing and/or copying and pasting, and for learning more about camouflage.

Closing (10 minutes)

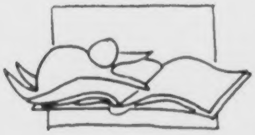
Review the day's activities with your students, and the meaning of the words ***camouflage** and ***habitat**. Remind students that they will need to bring in a toilet tissue tube for the next activity, if they have not already done so. Tell students that they will have the opportunity to explore the concept of ***camouflage*** further in the next lesson.

Parent Link

Natural Family History. Have students discuss with their families what they learned about habitat and camouflage in this lesson. Have parents enter into a discussion about the country, city, or neighborhood they grew up in. What birds, insects, or animals do they remember from their childhood? Do they recall any stories associated with how an animal got its spots, or why its beak is long, etc.? Any songs, myths, legends they can share with their children? Encourage parents to engage their children in these stories, and to visit the library together to learn more facts. If you know of parents who grew up in remote or interesting places (say, a rainforest or desert), invite them to class to share photographs and personal stories of animals and their habitats.

Enlace familiar

Historia Natural de la Familia. Pida a los alumnos conversar con sus familias sobre lo que han aprendido en esta lección acerca del habitat y el camuflage. Pida a los padres que conversen sobre el país, ciudad o vecindario donde crecieron. ¿Qué tipo de pájaros, insectos o animales recuerdan de su infancia? ¿ Recuerdan alguna historia que asocie la forma en que un animal obtuvo sus manchas, o porqué su pico es largo, etc.? ¿Recuerdan los padres alguna canción, mito o leyenda que puedan compartir con sus hijos? Anime a los padres a que conversen con sus niños de este tipo de cuento y a que visiten juntos la biblioteca para aprender más datos. Si sabe que algunos padres crecieron en lugares alejados o interesantes (por decir, en una selva o un desierto), invítelos a la clase para que compartan fotografías e historias personales de los animales y sus hábitats.



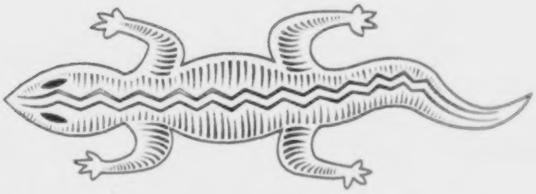
Literature Link

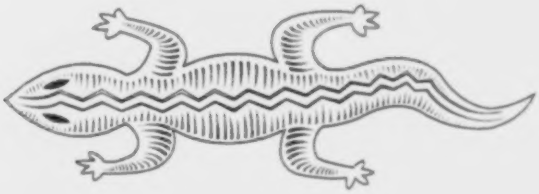
The following books written by Ruth Heller provide imaginative and creative links to the difficult concept of camouflage introduced in this lesson: *How to Hide a Polar Bear and Other Mammals, How to Hide an Octopus and Other Sea Creatures, How to Hide a Butterfly and Other Insects, How to Hide a Meadow Frog, and How to Hide a Crocodile and Other Reptiles.* These books are recommended for grades 1-3.

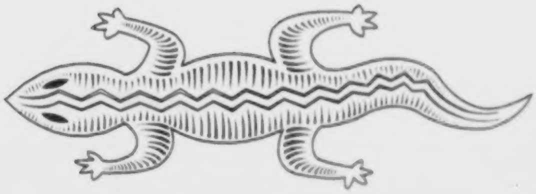
Animal Camouflage, by Annabelle Donati, surveys camouflage in the animal kingdom, from amphibians to reptiles to insects and birds and their eggs. Wonderful illustrations are accompanied by brief, informative narratives. "Amazing but True" highlights of fun and unusual facts will amaze the young reader. Recommended for grades 4-6.

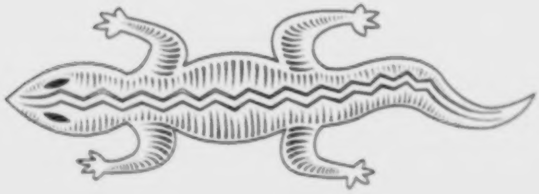
Handout 8.1

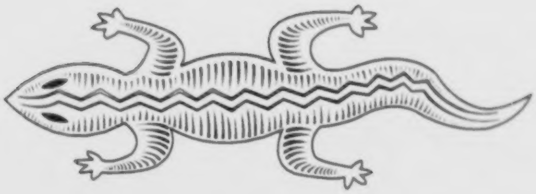
Lizard Strip Pattern

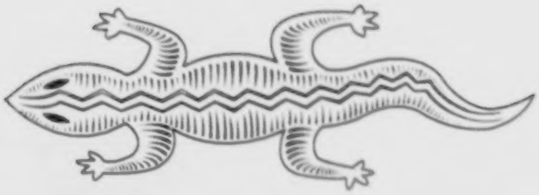






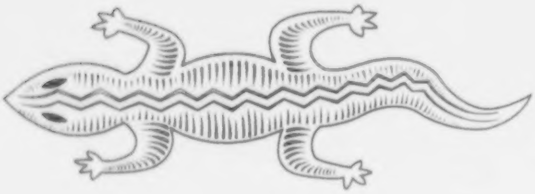
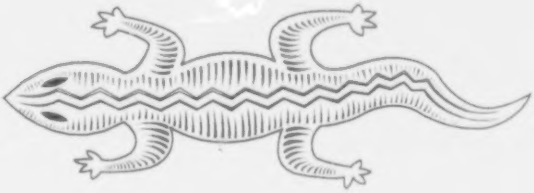
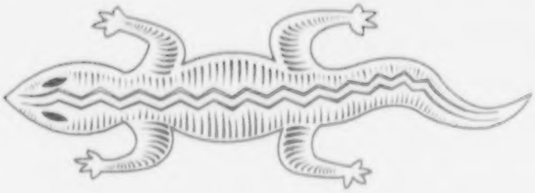
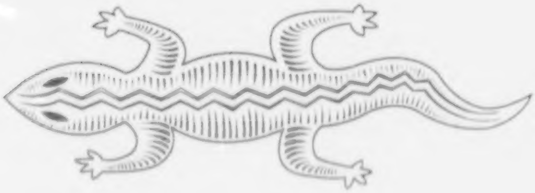
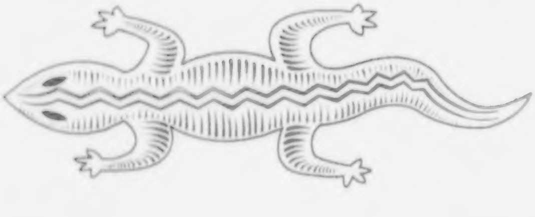
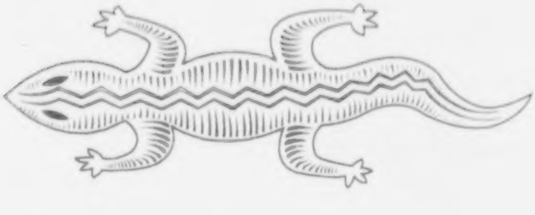






Hoja de trabajo 8.1

Diseño de tiras de lagartija

Lesson 9

Camouflaged Critters (Part II)
Criaturas en camuflage (Parte II)

Overview

This lesson continues the discussion of how animals protect themselves. It reinforces the important relationship between an animal's ***habitat** and its way of ***"masking"*** or ***camouflaging** itself.

Resumen

En esta lección los alumnos siguen estudiando sobre cómo los animales se protegen camuflandose o disfrazándose. Se refuerza la ***relación** importante entre el ***habitat** del animal y su manera de ***disfrazarse.**

Key Skills

Observing

Inferring

Comparing

Creating

Writing

Destrezas claves

Observar

Hacer inferencias

Comparar

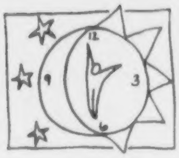
Crear

Redactar

Preplanning

1. Review "Background for Teacher" information provided in Lesson 1.
2. Review the following terminology:

***masking**	***disfrazarse**
***caddis fly larva**	***mosca cádis**



Suggested Time

10 minutes—Welcoming
45 minutes—Homework/Learning Options
15 minutes—The Pencil-Eater
10 minutes—Guided Discussion
20 minutes—The Caddis Fly Larva
10 minutes—Journal
10 minutes—Closing

2 hours total

Materials

A teacher can conduct this lesson alone, if necessary. Because students will leave the classroom to collect materials from the school grounds in the second activity, the help of a teaching assistant is recommended. You will need the following materials:

- Pencils (one per child).
- Scrap paper of various kinds, rubber bands, staples, and tape.
- Toilet tissue tubes (one per child).
- Scissors (one per child).
- Glue.
- Natural materials gathered by children.

Suggested Quote/Cita Sugerida

The endangered are not species.
The endangered is "beauty,"
Unfrozen.

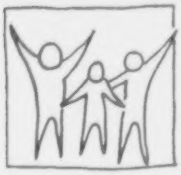
—Bernice Zamora, as quoted in *The Fire in Our Souls*

Ms. Zamora is a Chicana poet whose collection *Restless Serpents* is one of the seminal works of Chicana poetry.

Lo que está en peligro de extinción no son las especies. Lo que está en peligro de extinción es la "belleza" natural.

—Bernice Zamora

SESSION PLAN



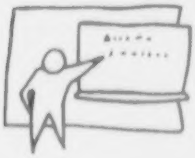
Welcoming (10 minutes)

Welcome students and take attendance. Have one or two children graph today's attendance on the class attendance chart. Ask other students to chart the day's weather.

Review the concept of **camouflage* and have a few students share their journal entry from the last lesson.

Homework/Learning Options (45 minutes)

Students should use this time to complete any homework assignments, or to receive individualized tutoring.



Curriculum

The Pencil-Eater (15 minutes)

Discuss with your students the problem of disappearing student pencils.

Tell the class:

"Pretend that an imaginary pencil-eater comes into the classroom every night to eat pencils. You will camouflage your pencils to protect them."

"Camouflage doesn't always mean that the color of the animal matches the environment. Animals also disguise themselves by using materials in the environment in order to resemble those surroundings."

"Camouflage your pencils by wrapping them in something or by attaching classroom materials to them. The pencils should be in plain sight, but because of their camouflage, they should not look like pencils."

El come-lápices

Diga a los alumnos:

"Vamos a hacer de cuenta que todas la noches un come lápices imaginario se mete al salón para comerse los lápices. Ustedes le van a hacer un camuflaje a sus lápices para disfrazarlos y protegerlos".

"El camuflaje no siempre quiere decir que el color del animal hace juego con el hábitat. Los animales también se disfrazan utilizando materiales del ambiente para parecerse a su hábitat".

"Háganles camuflaje a sus lápices envolviéndolos en algo o poniéndoles encima materiales del salón. Deben estar a plena vista, pero por el camuflaje, no deben de parecerse a lápices".

Guided Discussion (10 minutes)

Discuss with students how they went about disguising their pencils. Ask why they chose certain materials for their disguise.

Share the following:

"When you were disguising your pencils you were using another kind of camouflage called ***masking**." If available, show students photographs of animals who mask themselves.

Use the following examples to explain the concept of ***masking**:

- Some caterpillars put bits of leaves in their backs.
- Bagworms cover themselves with a bag made of leaves.
- Some crabs disguise themselves with seaweed.
- A sponge crab holds a live sponge over its back with its hind legs.

Tell students:

"An interesting insect that uses ***masking** is called the caddis fly. When the caddis fly is developing, the worm-like stage, or larva, builds itself a camouflaged tube. Only the head and legs of the caddis fly stick out of the tube. It can move the camouflaged tube around."

"If the caddis fly larva lives in slow streams or ponds, the caddis fly larva might build the tube out of tiny pieces of wood and leaves. If it lives in a fast stream, it may build the tube out of grains of sand or tiny rocks. The caddis fly larva looks like part of its surroundings because it builds its disguise out of materials that are found in its surroundings."

Diálogo dirigido

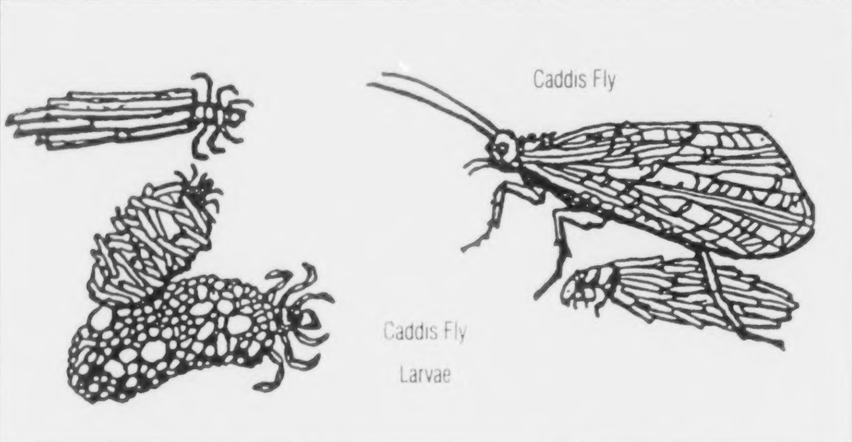
Explíquele a los estudiantes que cuando ellos estaban escondiendo sus lápices estaban usando otro tipo de camuflaje. Los estaban ***disfrazando**. Use los ejemplos a continuación para explicarle este concepto :

- Algunas orugas se ponen pedacitos de hoja en sus lomos.
- Algunos gusanos se cubren con una bolsa hecha de hojas.
- Algunos cangrejos se disfrazan con algas marinas.
- Con sus patas traseras el cangrejo esponja detiene sobre su lomo una esponja viva.

"Un insecto interesante que se disfraza es la mosca cadis. Cuando está creciendo, en la etapa de gusano o larva, se hace un tubo con camuflaje. Sólo se ven la cabeza y las patas. Puede mover el tubo para cualquier lugar".

"Si la mosca cadis vive en un estanque o arroyo lento, la larva puede hacerse su tubo de pedacitos de madera y hojas. Si vive en una corriente más fuerte, puede hacer su tubo de piedritas o granos de arena. La larva de la mosca cadis se parece a su ambiente porque se disfraza con materiales que se encuentran a su alrededor".

Demonstrate the developmental stages of the caddis fly on the chalkboard. Use Figure 1 below to illustrate at what stage the fly builds itself a tube.



The Caddis Fly Larva (20 minutes)
Tell the class that they are going to make a tube like a caddis fly larva's tube. They will begin with a toilet tissue tube. Their larva tubes will not use a stream or pond for their surroundings or habitat. Instead, each student will find a habitat for the caddis fly larva on the school grounds.

Have each student, or pair of students, take a small bag and scissors to the playground, and locate a habitat for her or his tube, where they will later hide their caddis fly larva (next lesson). After they select a habitat, they will gather natural materials and place them in the bags for later use in covering their tubes. Students will return to the classroom and begin gluing the materials they gathered to their tubes. The tubes should be allowed to dry overnight.

Suggestion:
Rather than bringing materials into the classroom, students could glue materials onto their tubes outside.

Optional Activity:
If you do not have access to a playground, use any area on or near the school grounds that does not resemble the classroom environment. How would students camouflage their tubes in a nearby field? In the neighborhood?

What sorts of materials would they glue to their tubes? Make sure students have permission to leave the Academia site, if required.

Journal (10 minutes)

In their journals, have students describe what is meant by ***masking** by writing a paragraph about this term. To accompany the paragraph, have students draw a picture of an animal that uses this technique or draw a picture of how they ***masked** their caddis fly larva.

Extension Activity

Try this exercise from the Vermont Institute of Natural Science called "Invisible for a Day." Have students pretend they are so well camouflaged for one day that they can move around without being seen. Then, have them write a story about what might happen.

Closing (10 minutes)

Review the two types of camouflage students have seen thus far [camouflage by matching color and masking]. Tell students that in the next lesson, they will hide their caddis fly larva in the habitat they have chosen for it on the school grounds.

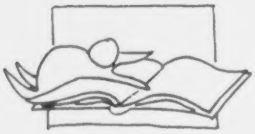
Begin a discussion about the importance of preserving an animal's natural habitat. For example, what would happen, to their caddis fly larva if the school grounds looked totally different the next time they saw them, and the habitat they chose for their caddis fly larva was gone?

Parent Link

"Be a Designer." This wonderful activity, also designed by the Vermont Institute of Natural Science, could prove to be a wonderful weekend activity for the family, especially on a rainy or snowy day. Have parents and children design camouflage outfits together for the following, and draw and color their designs (appropriate backgrounds should be included): skydiver, underwater swimmer, lion tamer, school teacher, gardener, skier, lumberjack, mountain climber, hunter, coal miner, etc.

Enlace familiar

"Sea un diseñador". Esta actividad maravillosa, también diseñada por el Instituto Natural de Ciencias de Vermont, podría ser una actividad familiar magnífica para un fín de semana, especialmente en un día que esté nevando o lloviendo. Haga que los padres y niños juntos diseñen trajes de camuflage para los siguientes (se debe incluir los fondos adecuados): paracaídista, buseador, domador de leones, maestro de escuela, jardinero, esquiador, leñador, escalador de montañas, cazador, minero, etc.



Literature Link

A House for Hermit Crab (available in Spanish from Hispanic Books Distributors), by Eric Carle, provides a wonderful exploration of ***masking** through the story of a hermit crab. Recommended for grades K-2.

Where Butterflies Grow, by Joanne Ryder, describes camouflage from the point of view of a butterfly, and provides students with a greater understanding of the developmental stages of the caddis fly. Recommended for grades K-5.

Eric Carle's *The Very Hungry Caterpillar* (available in Spanish from Hispanic Books Distributors) also provides an entertaining story of metamorphosis. Recommended for grades K-2.

144

Lesson 10

Camouflaged Critters (Part III)
Criaturas en camuflaje (Parte III)

Overview

In this lesson students begin to explore the relationship between camouflage, protection, and survival. As they increase their knowledge of animal behavior, they begin to understand the complex topic of ***natural selection**.

Resumen

En esta lección los alumnos empiezan a explorar la relación que existe entre el camuflaje, la protección y la supervivencia. Al aumentar su conocimiento de la conducta animal, empiezan a comprender el tema complejo de la ***selección natural**.

Key Skills

Applying
Experimenting
Simulating
Evaluating
Inferring
Writing

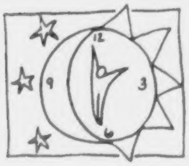
Destrezas claves

Aplicar
Experimentar
Simular
Evaluar
Hacer inferencias
Redactar

Preplanning

1. Construct placards which say "probably" and "probably not." (Two of each — one set for each half of the class.)
2. Review the terminology list:

natural selection ***selección natural***



Suggested Time

10 minutes—Welcoming
45 minutes—Homework/Learning Options
20 minutes—The Tube Test
10 minutes—Guided Discussion
10 minutes—Probably/Probably Not
15 minutes—Journal
10 minutes—Closing

2 hours total

Materials

A teacher and a teaching assistant are needed to implement this lesson. In addition, you will need.

- Caddis fly larva tubes.
- 4 pieces of stiff paper that could serve as placards (optional).

Suggested Quote/Cita Sugerida

The endangered are not species.
The endangered is 'beauty,'
Unfrozen.

—Bernice Zamora, as quoted in *The Fire in Our Souls*

Ms. Zamora is a Chicana poet whose collection *Restless Serpents* is one of the seminal works of Chicana poetry.

Lo que está en peligro de extinción no son las especies. Lo que está en peligro de extinción es la "belleza" natural.

—Bernice Zamora

Welcoming (10 minutes)

Welcome students and take care of any standard opening activities (taking attendance and assigning students to chart the attendance and temperature). Review the concept of **_*masking_**, and have a few students read their journal entries on "masking." Tell students that today they will place the caddis fly larva tubes that they prepared in the last lesson in their habitats.

Homework/Learning Options (45 minutes)

Students may use this time to complete homework assignments or to receive individualized tutoring.

Curriculum

The Tube Test (20 minutes)

Divide the class into two groups. Take the groups with their camouflaged tubes to the schoolyard. Let one group "hide" its tubes in the best matching habitats. Keep the other group a distance away (perhaps, have the teaching assistant provide a distraction for about five minutes to prevent peeking). Remind students that some part of the disguised tube must be kept visible. After the first group has hidden their caddis flies, allow the second group to look for them. If some tubes cannot be located, have the first group act as guides to help the second group try to locate them.

After all the tubes are found, the groups will reverse roles and the other group will "hide" its tubes in selected habitats.

Suggestion:

Use this activity as an evaluation tool.

Did students use appropriate colors?

Did students use camouflage materials similar to those in the selected natural habitat?

Guided Discussion (10 minutes)

After all the tubes have been collected, discuss the effects of destroying an animal's natural habitat.

Ask the students:

"What would happen if we destroyed an animal's natural habitat? [The animal would not be able to protect itself from predators; as a result, a predator could find its prey. This eventually causes a decrease in food supply, reducing the predator's chance of survival.] For example, what would happen if we tried to hide the tubes in the classroom? Would they be well hidden? Which caddis flies do you think would survive? [Those that look like the classroom.] If some flies survive because of a particular characteristic (for example, if some flies look more like the classroom than others), this is called ***natural selection**. These flies are selected to live by nature because of a characteristic they have—the way they look—and this will provide them with the opportunity to have children that also look like them. These children, if they live in this same habitat, or if the habitat doesn't change, will also have a better chance of surviving."

Pregúnte a los alumnos:

Divida la clase en dos, cada grupo debe esconder sus tubos y tomar turnos buscando los tubos del otro grupo. Pregunte a los alumnos:

"¿Qué pasaría si destruyéramos el hábitat natural de un animal? [El animal no podría protegerse de sus enemigos y ellos encontrarían fácilmente su presa. Con el tiempo, esto causaría una reducción en la provisión de comida para el enemigo natural, reduciendo de esta manera la posibilidad de que el enemigo natural sobreviva]".

"Por ejemplo, ¿Qué pasaría si tratáramos de esconder los tubos en el salón? ¿Estarían bien escondidos? ¿Qué moscas sobrevivirían? [Las que más se parecen al salón]. Si algunas moscas sobreviven a causa de una característica en especial, por ejemplo si se parecen al salón, a esto se le llama ***selección natural**. La naturaleza escoge a estas moscas para que vivan, por una característica particular—cómo se ven—y esto les permite tener crías que se les parezcan. Si la cría vive en este mismo hábitat o si el hábitat no cambia es más posible que esta cria sobreviva".

Probably/Probably Not (10 minutes)

To reinforce the concept of camouflage play a game called "Probably/Probably Not." Divide the class into teams, or ask them to give a group response to the following rhymes. You can use the same groups you created in the previous activity. Each group should respond "probably" or "probably not," either orally or visually, using the prepared placards.

Would a tan camel with bony knees...
hide in a forest of Christmas trees? **[probably not]**

Would a skinny lizard of bright, bright green...
sit on a red flower and not be seen? **[probably not]**

Would a bumpy, lumpy crocodile...

float down the river once in a while? **[probably]**

Would a grumbly, growling, grizzly bear...
hide on the lawn like he wasn't there? **[probably not]**

Would a very hungry green-striped snake...
hide in the grass by a little lake? **[probably]**

Would a fat and furry little brown bunny...
hop through the woods on a day bright and sunny? **[probably not]**

Would a grey and brown, muddy frog...
take a nap on a fallen log? **[probably]**

Would a jungle parrot with a yellow bill...
be sliding down a snowy hill? **[probably not]**

Would a striped tiger with a loud fierce roar...
be in the middle of a grocery store? **[probably not]**

Would two giraffes with long necks each...
be eating coconuts on a sandy beach? **[probably not]**

Probablemente/Probablemente no

¿El camello café de rodillas huesudas...
se escondería en un bosque entre pinos y ardillas? **[probablemente no]**

¿La lagartija de color verde brillante...
se sentaría en una flor roja para esconderse? **[probablemente no]**

¿El cocodrilo rasposo y arrugado...
flotaría por un río de vez en cuando? **[probablemente sí]**

¿Verías a un oso enojado y malhumorado
en un jardín floreado? **[probablemente no]**

¿Se escondería una culebra verde y rayada
en el pasto junto al agua?**[probablemente sí]**

¿Un conejito gordo y juguetón...
saltaría por el bosque en un día soleado? **[probablemente no]**

¿Una rana cubierta de lodo...
dormiría la siesta sobre un tronco? **[probablemente sí]**

¿Un perico de pico amarillo brillante...
jugaría en la nieve en un día frío? **[probablemente no]**

¿El rugido feroz de un tigre rayado...
se oiría en el supermercado? **[probablemente no]**

¿Dos girafas altas y preciosas...
comerían cocos en una playa arenosa? **[probablemente no]**

Journal (15 minutes)

Have students write in their journals about the concept of ***natural selection.*** Ask them to write a paragraph or two on the animal they think would have a better chance of surviving and why:

A. A white polar bear that lived in the snow (The North Pole), or

B. A brown grizzly bear that lived in the snow.

Closing (10 minutes)

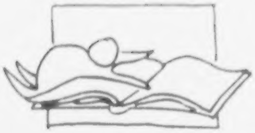
Reinforce the concepts students have learned in these first three lessons—camouflage, masking, and natural selection. Have students think of some characteristics people have that help them survive. Some examples include their ability to build shelters to protect themselves from the weather, their use of tools to hunt or grow food, and their ability to work together.

Parent Link

This lesson is a great opportunity for children and parents to visit dinosaurs at a museum. Parents can discuss the connection between natural selection and extinction.

Enlace familiar

Esta lección da a los padres y los niños la maravillosa oportunidad de visitar los dinosaurios en el museo. Los padres pueden discutir la conección que existe entre la selección natural y la extensión.



Literature Link

The Salamander Room, by Anne Mazer, like the Ruth Heller books mentioned earlier, also provides an entertaining and educational account of the relationship between animals and their habitats. Recommended for grades K-3.

Lesson 11

Breakfast for the Birds
El desayuno para los pájaros

Overview

Students learn about ***adaptation*** through a study of birds' beaks, and continue to explore the important relationship between an animal's behavior and its habitat.

Resumen

Al estudiar los picos de las aves, los alumnos aprenden acerca de la ***adaptación*** de los animales a su ambiente. Siguen explorando la importante relación entre la conducta de un animal y su hábitat.

Key Skills

Observing
Inferring
Predicting
Sorting
Recording data
Graphing
Interpreting data

Destrezas claves

Observar
Hacer inferencias
Hacer predicciones
Seleccionar
Anotar datos
Hacer gráficas
Interpretar datos

Preplanning

1. Go to your local library and find books that will illustrate the various types of beaks found on birds.
2. Copy of Handout 11.1, "Best Beak Graph," (one per student).
3. Enlarge one copy of the "Best Beak Graph," or draw an enlarged version on the board or on a large piece of paper.
4. Make four large versions of the "Best Beak Graph" to record class data. Change the vertical axis so it numbers 1 to 60, rather than 1 to 16.
5. Fill the plastic containers 2/3 full of water.
6. Read "Background for the Teacher."
7. Review the terminology list:

***food generalists**	***generalistas de alimento**
***food specialists**	***especialistas de alimento**
***adaptation**	***adaptación**

Background for the Teacher

Tie a man's hands behind his back, stand him on his feet, and tell him that he must thereafter find, catch, and prepare his food, build his house, defend himself against his enemies, and perform all the business of life in such a position, and what a pitiable object he would be.

—William Beebe, Naturalist

Birds are in a position similar to the one Beebe described. Through time, the forelimbs of ancient birds evolved into wings, which are superb for flying, but relatively useless for the tasks mentioned in the quotation. Instead of using forelimbs and hands to perform survival tasks, birds have a unique and wonderful tool: a beak. The beak of a bird is essentially a lightweight, bony extension of the skull. The skin covering the beak of a bird generates keratin (the same material that makes up the fingernails and hair of humans). The keratin compacts and dries, forming the tough, glossy, hard outer covering of the beaks of most birds. The tip and cutting edges of the beak are continually renewed as they wear away. Beaks are multi-functional devices. Birds use them to weave nests, defend territories, attack rivals, groom feathers, communicate, and, most important, to gather or capture food.

A wide diversity of bird beaks has evolved over time. Although many birds have straight beaks ***adapted** to general feeding, the following birds have beaks that are examples of unique ***adaptations**:

- Eagles and other raptors have strong, hooked beaks that tear flesh.
- Anhingas and herons spear or grasp fish and frogs with dagger-like bills.
- Pelicans use their pouched beaks as nets to dip for fish.

- A flamingo holds its bent bill upside down in shallow water. As the flamingo's tongue pumps water in and out, the teeth-like ridges of the bill strain out algae and small animals.
- The red crossbill's upper beak twists in one direction and the lower beak twists in the opposite direction, creating a unique tool for extracting pine seeds from an open cone.
- Hummingbirds draw nectar from flowers with a tubular tongue protected by a hollow beak.
- Swallows and whippoorwills catch flying insects with their large, gaping mouths.
- Cardinals and grosbeaks use their short, cone-shaped beaks to crack open seeds.
- Snipes and kiwis have long beaks they use to probe for worms and other small animals in the mud and water.
- Woodpeckers use a chisel-type beak to search for insects in trees.
- The yellowbellied sapsucker drills into living trees, and feeds on the sap and the insects attracted to the holes.

It is important to note that environmental changes, such as those caused by the clearing of forests or the draining of wetlands to build cities, has radically altered the ***habitats** of many organisms. The destruction of habitats is the major threat to bird life in the world today. This will be discussed in greater detail later in this unit and in subsequent units.

Información para el/la maestro/a:

Si a un hombre le amarráramos las manos, lo pusiéramos de pie y le dijéramos que en esta posición ahora tendrá que encontrar, atrapar y preparar su alimento, construir su casa, defenderse de sus enemigos y hacer todo lo que necesita en su vida diaria en esta posición, ¡qué objeto tan ridículo sería!

—William Beebe, Naturalista

La situación de las aves es parecida a la que describió Beebe. A través de la evolución, las extremidades superiores de las aves antigüas se convirtieron en alas, las que son magníficas para volar, pero relativamente inútiles para hacer las tareas a las que se refiere la cita. En vez de usar brazos y manos para desempeñar las tareas de supervivencia, las aves tienen un instrumento único y maravilloso que es el pico. El pico es una extensión ligera y huesuda del cráneo del ave. La piel que cubre el pico produce keratina (el mismo material que forma las uñas y el cabello humano).

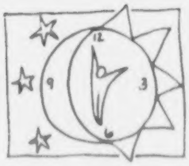
La keratina se endurece y se seca, formando la cubierta dura y brillante del pico de la mayoría de las aves. La punta y las orillas cortantes del pico se renuevan

contínuamente al irse gastando. El pico tiene muchas funciones. Los pájaros lo utilizan para tejer sus nidos, defender su territorio, atacar a sus enemigos, asearse las plumas, comunicarse y para algo muy importante: el recoger o capturar alimento.

A través del tiempo han evolucionado muchos tipos distintos de picos. Aunque muchas aves tienen picos rectos **_*adaptados_** a la alimentación general, los picos de las siguientes aves son ejemplos de adaptaciones especiales:

- ☆ Las águilas y otras aves de rapiña tienen picos fuertes y encorvados que desgarran carne.
- ☆ Las anhingas y las garzas atraviesan a los peces o las ranas con sus picos en forma de puñal.
- ☆ Los pelícanos usan sus picos abolsados como redes para recoger peces.
- ☆ El flamenco mantiene al revés su pico curvo, en agua poco profunda. Mientras la lengua bombea dentro y fuera el agua, las crestas del pico, que parecen dientes, cuelan las algas y los pequeños animales.
- ☆ El pico superior del piquituerto rojo se tuerce hacia una dirección y el pico inferior hacia el lado opuesto, creando un instrumento único para sacar de las piñas las semillas de pino .
- ☆ Los picaflores sacan el néctar de las flores con una lengua tubular, protegida por un pico hueco.
- ☆ Las golondrinas y los chotacabras atrapan insectos voladores con sus bocas grandes abiertas.
- ☆ Los cardenales y los conirrostros usan sus picos cortos en forma de cono para quebrar semillas.
- ☆ Las agachadizas y los kiwis tienen picos largos que usan para buscar gusanos y otros animales pequeños entre el lodo y el agua.
- ☆ Los pájaros carpinteros usan su pico como cincel para buscar insectos en los árboles.
- ☆ El picamadero amarillo agujerea un árbol vivo y se alimenta de la savia y los insectos que atraen los agujeros.

Es importante notar que los cambios ambientales, como el talar bosques o drenar zonas pantanosas para construir ciudades, han alterado radicalmente el hábitat de muchos organismos. En el mundo actual la destrucción del hábitat es la amenaza principal a la vida de las aves. Más adelante se estudiará esto en más detalle, en esta unidad y en las posteriores.



Suggested Time

10 minutes—Welcoming
45 minutes—Homework/Learning Options
25 minutes—Activity: The Best Beak
20 minutes—Discussion and Graphing
10 minutes—Debriefing
10 minutes—Closing

2 hours total

Materials

The help of a teaching assistant is recommended for the implementation of this activity. In addition, you will need the materials listed:

- Approximately 60 small marbles.
- Approximately 60 raisins.
- Uncooked macaroni or short lengths of drinking straws, approximately 60.
- Styrofoam packing material, approximately 60 pieces.
- One box of round wooden or plastic toothpicks.
- 8 large spring-type (clip) clothespins.
- 8 pairs of students scissors.
- 8 plastic spoons.
- Large plastic containers such as two-pound margarine containers (one per group of 4-6 students).
- One plastic sandwich bag per student.
- Handout 11.1, "Best Beak Graph."
- Pencils and green, red, orange, and blue colored crayons.

Suggested Quote/Cita sugerida

The endangered are not species.
The endangered is 'beauty,'
Unfrozen.

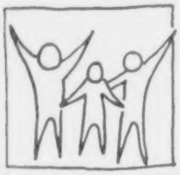
—Bernice Zamora, as quoted in *The Fire in Our Souls*

Ms. Zamora is a Chicana poet whose collection *Restless Serpents* is one of the seminal works of Chicana poetry.

Lo que está en peligro de extinción no son las especies. Lo que está en peligro de extinción es la "belleza" natural.

—Bernice Zamora

SESSION PLAN



Welcoming (10 minutes)

Welcome students and take attendance. Assign a few students to chart today's attendance and temperature or weather.

Begin today's lesson by asking students the following questions:

- ☆ Would you use a fork to eat soup?
- ☆ A spoon to eat meat?
- ☆ Would you use a straw to cut a watermelon?
- ☆ Would you use a spoon to eat a raw apple?

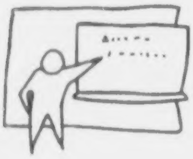
Pregunte a los alumnos:

- ☆ ¿Tomarían sopa con un tenedor?
- ☆ ¿Comerian carne con una cuchara?
- ☆ ¿Cortarian sandía con un popote (sorbeto, pajilla)?
- ☆ ¿Comerían manzana cruda con una cuchara?

Help students realize that different foods require different utensils or tools. Then, ask students to name the utensil or tool birds use to capture their food. Show the class pictures of birds with different beaks. Ask students to look at the birds' beaks and describe some of the similarities and differences. Tell the class that today they will work in their cooperative groups and pretend they are all birds with different types of beaks. We want to find out why birds have different kinds of beaks.

Homework/Learning Options (45 minutes)

Students should use this time to complete any homework assignments, engage in free reading, or receive individualized tutoring.



Curriculum

The Best Beak (25 minutes)

Have students break into their cooperative learning groups. Tell students that everyone will pretend to be a bird and will have a beak. Remind students that the beaks they will have do not work exactly like actual bird beaks, but they do represent the variety that exists in nature. Demonstrate the use of each beak (utensil) and the stomach (cup) as follows:

Clothespin: Hold the clothespin at the very end so that it opens as wide as possible. Pinch and release with one hand.

Toothpick: Hold the toothpick in one hand and carefully spear the food with it. Use one finger of the opposite hand to push the food off the toothpick into the cup.

Scissors: Insert the thumb and finger in the holes and hold the scissors downward. Use the scissors like tweezers. (Do not use the scissors like a spear.)

Spoon: Hold the end of the spoon and scoop the food. Use only one hand.

"Stomach" cup: Cups can be moved to the source of the food, but they must be left upright on the floor or table for the food to be deposited.

After dividing the class into their cooperative groups, ask each group to form a small circle and be seated. Distribute a variety of beaks to each group and let each member select a beak. Be sure that each type of beak is represented in each group. The students will keep the same beaks throughout the entire game. Supply a stomach (cup) and a plastic lunch bag for each group member.

Tell students:

"I will be distributing into the center of your group various types of materials which represent the type of foods birds eat. When I give you the signal, you will begin picking up this food with your beak and putting it in your stomach which is the cup in front of you. Make sure you only use your beak to pick up the food and put in your cup."

Dígale a los alumnos:

"Voy a poner en el centro del grupo varios materiales que representan el tipo de alimento que comen los pájaros. Cuando dé la señal, ustedes empiezan a recoger la comida con sus picos y la ponen en su estómago, que es la taza que tienen en frente. Asegúrense de usar sólo el pico para recoger el alimento y ponerlo en la taza".

Scatter approximately the same number of macaroni "worms" in the center of each circle. Give the students a signal to start picking up the worms with their beaks. Once students have exhausted the food source, tell them to store their worms in the plastic baggies, and discuss the difficulties they had in capturing the worms with the different beaks. Refer to the contents of the plastic bag as "evidence," and reassure unsuccessful students that they will have a chance to collect a food better suited to their beaks.

Repeat the food capturing activity with the raisin "grubs," marble "snails," and then with the styrofoam "water bugs" floating in the water-filled plastic containers. After each activity, allow students time to add the grubs, snails, and water bugs to their evidence bags.

Collect the beaks, cups, and water-filled containers. Tell students to hold on to their evidence bags. (They will need them for the graphing exercise.)

Discussion and Graphing (20 minutes)

Distribute Handout 11.1, pencils, and crayons to each student. Begin a discussion by allowing students to describe the type of beak they used and the experience they had in picking up the various types of food. Students should notice that they had a difficult time picking up some types of food and an easier time with other types.

Write the names of the beaks on the board (whatever name students come up with; e.g.,"spoon beak," "toothpick beak," etc.). Display the large copy of the students' "Best Beak Graph." Instruct all students to write on their individual graphs the name of the type of beak they used.

Read the names of the foods listed across the bottom of the graph. Explain that the numbers on the side of the graph match the spaces in each food column. Tell students to empty the contents of their evidence bags, and to sort the different foods into piles. Ask students to arrange the worms in the worm column on the graph, placing one worm in each space; then, have them arrange the grubs, snails, and water bugs in separate columns. Next, have students draw a line at the top of each column in case the foods are knocked off the graph.

After the students arrange all of their evidence in columns, have them make a green "x" in each space on the graph that contains a worm. Have them follow the same procedure for the other types of food, using red "x's" for grubs, orange "x's" for snails, and blue "x's" for water bugs. Ask them to write the total number of "x's" at the top of each column. After all the data are recorded, ask students to examine their graphs.

Ask the following questions:

"What information does your graph show?"

"What was your beak best for?"

Pregunte a los alumnos:

¿Qué información nos muestra la gráfica?

¿Para qué sirvió mejor tu pico?

Post the four large "Best Beak" graphs. These graphs will show the cumulative data for the class. Label each graph with the name of one beak. To record the cumulative data, start with the graph of the "toothpick beaks," and ask all the students with toothpick beaks to indicate how many worms they captured. If the total number of worms the toothpick beaks captured was fourteen, draw fourteen green "x's" in the column labeled "worms." Mark the red "x's" and continue to fill in the graph of the toothpick beaks. Continue to fill in data on the graphs for the spoon beak, scissor beak, and clothespin beak. After you have recorded all the data on all four charts, ask students the following questions:

☆ What did all the beaks do?

☆ What couldn't some beaks do?

☆ Which beak was best for capturing many types of foods?

☆ Were some beaks good at capturing only one type of food? Which beaks and which food?

☆ What evidence do you have for these answers?

Pregunte a los alumnos:

☆ ¿Qué hicieron todos los picos?
☆ ¿Qué cosas no pudieron hacer algunos picos?
☆ ¿Cuál fue el mejor pico para capturar una variedad de comida?
☆ ¿Hubo algunos picos que funcionaron sólamente para capturar uno o dos tipos de comidas?
☆ ¿Qué picos fueron y qué comidas?
☆ ¿Qué evidencia tienen para respaldar sus respuestas?

Debriefing (10 minutes)

After discussing the graphs, remind students that the tool a bird uses to get food is very important. Ask students if they could imagine what would happen to a bird that had a "toothpick" beak, for example, and could only find marble "snails" to eat?

"We call birds that eat only one or a few types of food ***food specialists**.* Most ***food specialists*** have beaks especially ***adapted*** for certain foods. If these foods are not available in the bird's habitat, the bird must go somewhere else to find the special food or it will die. Which of the beaks you used belong to food specialists? Can you give me examples of real birds that are food specialists? [Provide students with examples and photos. The hummingbird's long beak, for example, is adapted to get nectar and small insects from flowers.]"

"We call birds that eat a wide variety of food, ***food generalists***. These birds can live in a greater variety of places than ***food specialists***. Which of the beaks you used today might belong to ***food generalists***? A bird called a bluejay can eat seeds, berries, nuts, grains, fruit, insects, snails, small birds, frogs, salamanders, and eggs. Do you think this bird is a *__*food generalist__* or a *__*food specialist__*?"

Diga a los alumnos:

"A los pájaros que comen solamente uno o pocos tipos de comida, los llamamos ***especialistas**. La mayoría de los ***especialistas** tienen picos ***adaptados** para cierto tipo de comida. Si el pájaro no encuentra este alimento en su propio hábitat, tiene que buscarlo en otra parte para no morir. De los picos que usaron, ¿cuáles eran de un ***especialista**? Me pueden dar ejemplos de pájaros reales que sean especialistas? [Provea ejemplos y fotos para los alumnos. Por ejemplo, el pico largo del picaflor (o colibrí), está adaptado para extraer néctar e insectos pequeños de las flores]".

"A los pájaros que comen una variedad de comidas los llamamos ***generalistas**. Estos pájaros no son tan limitados como los ***especialistas** en cuanto a donde pueden vivir. De los picos que usaron hoy, ¿cuáles podrían pertenecer a un ***generalista**? El pájaro llamado azulejo se alimenta de semillas, bayas, nueces, granos, frutas, insectos, caracoles, pájaros pequeños, salamandras y huevos. ¿Piensan que este pájaro es ***especialista** o ***generalista**?"

Closing (10 minutes)

In closing, tell students that they accomplished a very difficult task in graphing and were able to gather important information. They learned about a way in which animals ***adapt** to their ***habitat**. Birds, for example, have a tool that allows them to eat the type of food which is available in their ***habitat**. In the next lesson, students will learn how animals communicate.

Parent Link

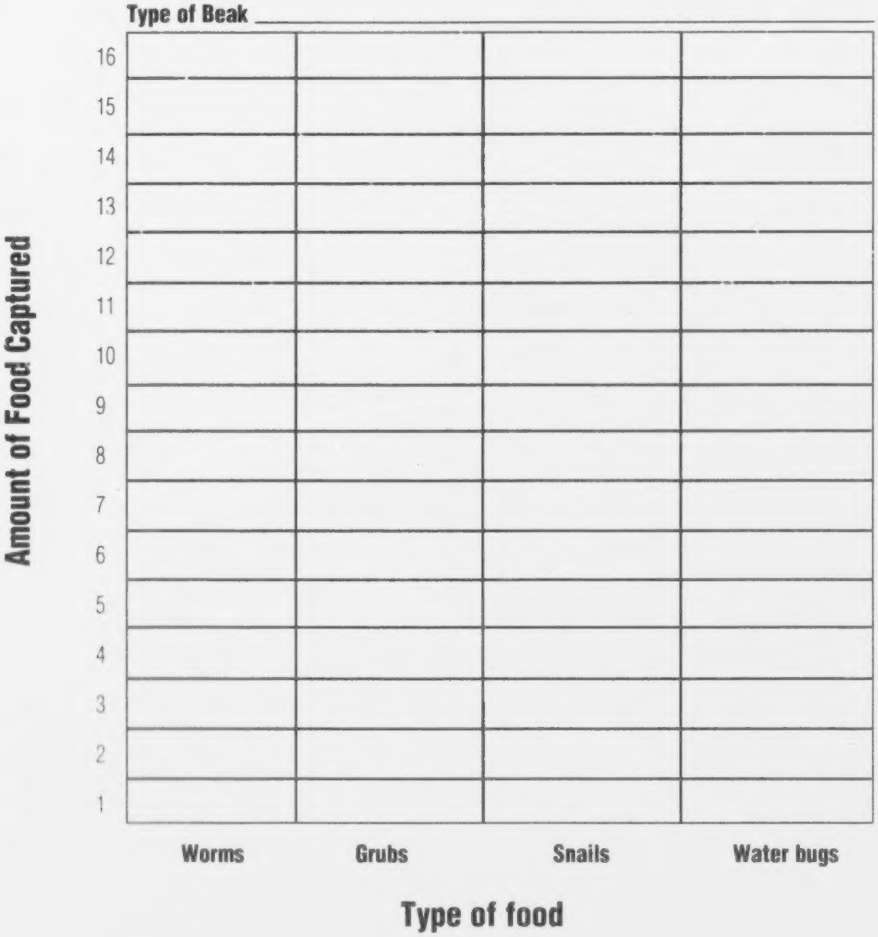
Do humans adapt to their habitats, too? Human bodies may not adapt physically to their environments the way those of animals do, but people certainly undergo adaptations. Can humans from tropical forests learn to adapt to life in Alaska? What adaptations must a person who has been raised in farmland go through to survive in the city? And, vice versa? How about someone from the coast to the mountains, and someone from the mountains to the coast? What changes would a person in that situation undergo? Have parents engage students in a dialogue about adaptations their family has had to go through, and that parent or her/his own family or ancestors. Have them finish by sharing with their child what the parent or family learned about the experience.

Enlace familiar

¿Se adaptan los seres humanos a sus hábitats también? Los cuerpos humanos posiblemente no se adapten físicamente al ambiente en la misma forma que los animales lo hacen, pero ciertamente sufren adaptaciones. ¿Los seres humanos que vienen de selvas tropicales pueden adaptarse para vivir en Alaska? ¿Qué tipo de adaptaciones debe hacer una persona que ha sido criada en el campo para sobrevivir en la ciudad y viceversa? ¿Que tál alguién que viene de la costa a las montañas y alguién que viene de las montañas a la costa? ¿Qué tipo de cambios tendría que hacer una persona en esta situación? Pida a los padres que inicien con sus hijos un diálogo acerca de las adaptaciones que ellos, su familia o sus ancestros han vivido. Pidales que comparen con sus hijos lo que los padres o la familia han aprendido acerca de esta experiencia.

Handout 11.1

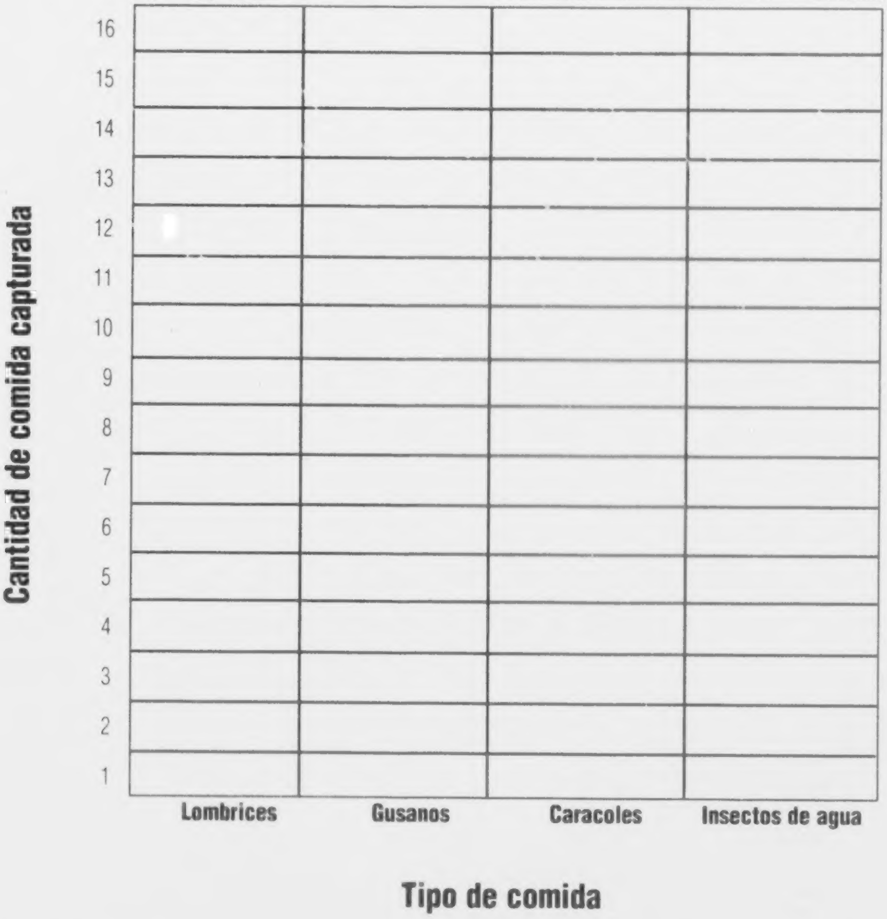
Best Beak Graph



Hoja de trabajo 11.1

Gráfica del mejor pico

Tipo de pico____



Lesson 12

Beaks, Bills, and Purpose
Picos y propósitos

Overview

Working in their cooperative learning groups, students deepen their knowledge about camouflage, natural selection, and adaptation. Students design a beak of their own that will fulfill a particular task.

Resumen

Trabajando en sus grupos de aprendizaje cooperativo, los alumnos siguen estudiando el camuflaje, la selección natural y la adaptación. Cada quien diseña un pico con una función especial.

Key Skills

Reading
Writing
Listening
Problem-Solving
Cooperating
Creating

Destrezas claves

Leer
Redactar
Escuchar
Resolver problemas
Cooperar
Crear

Preplanning

1. Review your procedures and rules for work stations with the teaching assistants, assign teaching assistants to them, and make sure each one knows her/his responsibilities.

2. For Work Station I, find a story, or stories, that discuss camouflage, natural selection, or adaptation. The story can be either factual or fictional. Use a title from past Literature Links that has not yet been read, or choose from those suggested below:

Carle, Eric. *The Mixed-Up Chameleon.* New York: Harper & Row, 1975. Recommended for grades K-2.

Ryder, Joane. *Lizard in the Sun.* New York: William Morrow, 1990. Recommended for grades K-2.

3. Cut and separate Handout 12.1, "Task Cards." Each group at Work Station II will choose one task out of the eight (not all tasks will be represented).
4. Copy "Cinquain" sample from Work Station III onto board, chart paper, or transparency. Select pictures of animals used in class during the unit, or from other sources like a field guide to local birds, etc.

Suggested Time

5 minutes—Welcoming
45 minutes—Homework/Learning Options
20 minutes—Work Station I: Language Development
20 minutes—Work Station II: Creating the Ultimate Beak
20 minutes—Work Station III: *Nuestro mundo creativo*
10 minutes—Closing

2 hours total

Materials

Teaching assistants are needed to implement this activity, using the materials listed below.

Work Station I:

- Stories as described in "Preplanning" above.

Work Station II:

- Scissors.
- Crayons and/or markers.
- String, tape, glue.
- Assorted art, craft, and scrap materials.
- Variety of colored construction paper, and Handout 12.1.

Work Station III:

- Copies of Handout 12.2 on color paper.
- Writing utensils.
- Pictures described in "Preplanning."

Suggested Quote/Cita sugerida

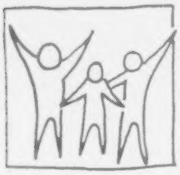
The endangered are not species.
The endangered is "beauty,"
Unfrozen.

—Bernice Zamora, as quoted in *The Fire in Our Souls*

Ms. Zamora is a Chicana poet whose collection, *Restless Serpents,* is one of the seminal works of Chicana poetry.

Lo que está en peligro de extinción no son las especies. Lo que está en peligro de extinción es la "belleza" natural.

—Bernice Zamora



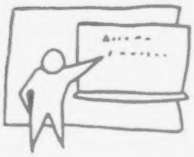
Welcoming (5 minutes)

Greet students and take attendance. Assign students to the various opening tasks of graphing today's attendance, and charting today's temperature or weather on the class charts.

Tell students that today they will be working in their cooperative learning groups at Work Stations and remind them of any rules you feel may need review.

Homework/Learning Options (45 minutes)

Students should use this time to complete any homework assignments, engage in free reading, or receive individualized tutoring.



Curriculum

Work Stations (1 hour; 20 minutes at each station)

Work Station I: Language Development

It is necessary for the teacher, or a teaching assistant, to staff this station. At this work station, students will either be listening to, or reading, a story that discusses camouflage, natural selection, or adaptation. Students should listen to the story carefully and be prepared to discuss the story after hearing it.

If time permits, discuss any words the children had difficulties with (these should be added to their word banks). Also, review the key concept of the story using the words that have been introduced in the unit thus far (***camouflage**, ***natural selection**, ***masking**, ***food generalist**, ***food specialist** and ***adaptation**).

Centro de trabajo 1: Desarrollo de lenguaje

Es necesario que el maestro o el asistente dirija este centro de trabajo. En este centro de trabajo, los estudiantes escucharán o leerán un cuento que trata de camuflaje, selección natural o adaptación. Los estudiantes deben escuchar el cuento cuidadosamente y prepararse para discutir el cuento después de haberlo escuchado.

Si el tiempo le permite, converse con los alumnos sobre las palabras con las cuales tubieron dificultad (estas palabras se deben agregar a sus bancos de palabras). También revise los conceptos claves del cuento usando las palabras que se han presentado en la unidad hasta ahora como (***camuflaje, *selección natural, *disfrazarse, *generalistas en comida, *especialistas en la comida** y ***adaptación**).

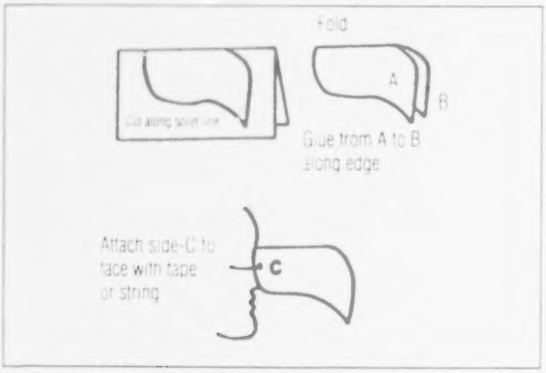
Work Station II: Creating the Ultimate Beak

It is necessary that this station be staffed by a teacher or a teaching assistant. At this work station students will use the concepts they have learned in the previous lesson to design the "ultimate beak." In the first part of the activity, students will work in a group with assigned tasks or roles. Some suggestions for role assignments within cooperative learning teams include the following: Time Keeper, Art/Design, Reporter, Supplies Monitor, Task Selector, Praiser, Recorder. In the second part of this activity, students will work individually to create their ultimate beaks.

One student within each cooperative learning group will randomly select a task card which describes a particular beak function. (Remove the task card once it has been selected by a group.) Once a task card has been selected, students should take approximately 10 minutes to discuss what sort of beak the group should design that will be able to perform the described task. During the discussion session, the teaching assistant or teacher staffing this station should assist the students in answering the following questions:

1. What birds have you seen that perform the same tasks or similar ones?
2. What sort of design would create the ultimate beak? Describe/explain design.
3. For what other tasks might your beak be used?

After coming to an agreement about their design for the ultimate beak, each student should spend approximately 10 minutes helping create the group's ultimate beak.


Fold
Cut along solid line
A
B
Glue from A to B along edge
Attach side-C to face with tape or string
C

Tell students:

Your whole group has to design a beak that will be able to perform the task your group has been assigned. Think about what sort of tool would help you perform this task. After your group has come up with a beak design, each group member will create the beak using the provided materials. By the end of this lesson, every group member should have a beak that looks the same and can perform the same task.

Have the group choose a color to paint their beaks, and figure out a way to attach them to their faces using tape or string. They will use these beaks during the closing, when the rest of the class tries to guess what food this type of bird might eat and how the bird might gather it.

Centro de trabajo 2: Creando el mejor pico

Si es necesario, este centro de trabajo debe ser dirigido por un maestro o un asistente. En este centro de trabajo los estudiantes usarán los conceptos que han aprendido en las lecciones previas para diseñar el "mejor pico". En la primera parte de la actividad, los estudiantes trabajarán en grupos con sus tareas o sus papeles asignados. Algunas sugerencias para asignar los papeles que van a jugar los alumnos dentro de su grupo cooperativo de aprendizaje incluyen los siguientes: Registrador del tiempo, diseñador/arte, reportero, supervisor de los materiales, seleccionador de las tareas, alabador, registrador. En la seguanda parte de esta actividad los estudiantes van a trabajar individualmente para crear su pico.

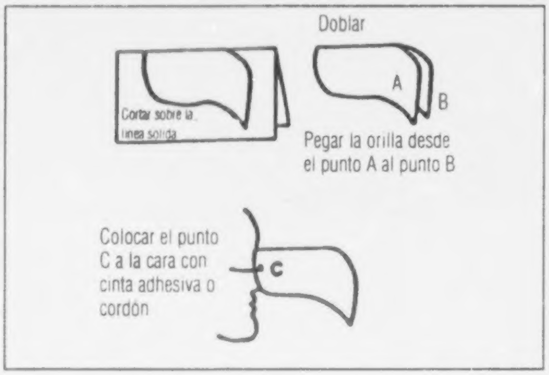
Un estudiante de cada grupo cooperativo de aprendizaje va a selecionar al azar una tarjeta con la tarea asignada el cuál describe una función particular del pico. (Una vez que haya seleccionado la tarjeta con la tarea asignada por el grupo póngalo a un lado). Una vez que se selecciona la tarjeta con la tarea asignada los estudiantes deben tomarse unos diez minutos para discutir sobre la clase de pico que el grupo debe diseñar y que sea capáz de desempeñar la tarea descrita en la tarjeta. Durante la discusión el asistente de maestro o el maestro debe ayudar a los estudiantes respondiendo a las siguientes preguntas:

1. ¿Qué pájaros han visto que hagan esta tarea o una tarea parecida?
2. ¿Cómo se diseñaría el "pico más esencial"? Describa/explique.
3. ¿Para qué otra cosa podría servir el "pico más esencial"?

Después de ponerse de acuerdo sobre el diseño del pico, cada estudiante debe tomar diez minutos aproximadamente para crear el pico más esencial.

Diga a los estudiantes:

Todos los estudiantes de tu grupo deben diseñar un pico que pueda hacer la tarea que se le asignó al grupo. Piensen qué instrumento les podría ayudar a hacer esta tarea. Después de que el grupo decida sobre el diseño, cada uno va a


Doblar
Cortar sobre la linea solida
A
B
Pegar la orilla desde el punto A al punto B
Colocar el punto C a la cara con cinta adhesiva o cordón
C

crear su propio pico usando los materiales provistos. Al terminar la lección, todos deben tener picos parecidos que puedan hacer la misma tarea.

Diga a los grupos que escojan un color para pintar sus picos y que vean alguna manera de colocarse los picos en sus caras usando una cuerda o una cinta adhesiva. Ellos usarán estos picos durante el cierre cuando el resto de la clase trate de adivinar qué clase de comida come este tipo de pájaro y como la obtiene.

Work Station III: *Nuestro mundo creativo*

"Cinquains" are one of the most popular poetic forms. (A poetic form is a recipe, or set of guidelines, for creating a poem.) Poetic forms are particularly suited for younger children, children who have difficulty writing, or those who find it more difficult to pull their thoughts out of thin air. Poetry recipes help direct our thoughts. Cinquains are very popular in the younger grades in public schools and, chances are, your students may have already tried these.

Tell students that they will be writing a poem today that will talk about some of the things they've learned in this unit. The poem has a recipe that we follow. Using this recipe will help them come up with a Cinquain. A recipe tells you exactly what to put in.

First, read the example, provided in the box ahead, to your group. After you have read the poem, show the group the copy of it on the transparency, the board, or chart paper. (You can ask the class if anyone has written one of these poems before and would be willing to help you explain it to the rest of the class.) Explain that all Cinquains have five lines. Then, review the recipe for each line, VERBALLY, following the outline provided ahead.

Distribute copies of Handout 12.2. Tell the group that you will be explaining the recipe again, one line at a time as they write down the "ingredients" the lines ask them for. (Remember that you may need to change your language for younger grades. For example, "adjective" becomes "describe word," and "verb" becomes "action word.") It is less intimidating for students to think of

one line at a time, rather than an entire set of them. This also encourages them to spend more time thinking about what they want to say and how they want to write it down, rather than rushing to get the whole job done. Before you have students begin to write their first line, take a moment to show them pictures of animals you've been looking at in class to discuss camouflage, masking, or adaption. A field guide to local birds can also be used, or you can turn this into a further learning experience by having students do research about birds or animals in Latin America before writing their cinquains. Pictures help out, but also remember that a noun (the subject line of the cinquain) can be almost anything; so that even pulling a word from their word banks should give students a place to start.

Cinquain Sample

Eagle
hunter, sharp
swooping, catching, fleeing
best eyes in natural world
bold

Cinquain Recipe

Line # 1: One word/(noun) subject of the poem.
Line #2: Two (adjectives) words that describe.
Line #3: Three (verbs) words showing action.
Line #4: Four words relating to a feeling.
Line #5: One word that repeats or refers to the subject in line #1.

Centro de trabajo 3: "Nuestro mundo creativo"

Los "Cinquains" son una de las formas poéticas más populares. (Una forma poética es una receta, o una serie de pautas para crear un poema). Las formas poéticas son particularmente apropiadas para niños pequeños que tienen dificultad al escribir o para aquellas personas que tienen dificultad en sacar ideas "de la nada". Las recetas para poemas ayudan a dirigir nuestros pensamientos. Los "Cinquains" son muy populares en los grados inferiores de las escuelas públicas y es probable que los estudiantes ya hayan visto esto.

Diga a los alumnos que hoy van a escribir un poema sobre algunas cosas que aprendieron en esta unidad. El poema tiene una receta que vamos a seguir. El uso de esta receta les ayudará a crear el "Cinquain". La receta les dice exactamente que van a poner.

Primero, lea a su grupo el ejemplo que está en el cuadro de abajo. Despúes de leer el poema, muestre al grupo la copia del poema en una transparencia, el pizarrón o un papel. (Puede preguntar a la clase si alguien a escrito este tipo de poemas y si le gustaría ayudarle a explicar al resto de la clase). Explique que todos los "Cinquains" tienen cinco líneas. Después revise VERBALMENTE cada línea de la receta siguiendo el esquema que se provee más adelante.

Distribuya copias de la Hoja de trabajo 12.2. Diga al grupo que va a explicar la receta nuevamente, línea por línea de manera que vayan escribiendo los "ingredientes" de las líneas que les toca escribir. (Recuerde que tal vez necesite cambiar el lenguage para estudiantes de grados menores. Por ejemplo, los "adjetivos" llegan a ser "palabras que describen", los "verbos" pueden ser "palabras de acción"). Es menos intimidante para los estudiantes pensar en una línea a la vez que en toda la serie. Esto también los anima a pasar más tiempo pensando en lo que quieren decir y cómo lo quieren escribir, en vez de apurarse para terminar todo el trabajo. Antes de que los estudiantes empiezen a escribir la primera línea, tome un momento para mostrar las fotografías de animales que han visto en la clase para conversar sobre camuflage, disfraz o adaptación. Se puede usar una guía local de pájaros, o puede convertirse esto en una investigación sobre los pájaros o animales de Latino América. Las fotografías ayudan, pero también recuerde que el nombre (del tema del "Cinquain") puede ser cualquier cosa, el sacar palabras de sus bancos de palabras les puede dar un buen comienzo.

Un ejemplo de Cinquain

Aguila

cazador, listo

abalanzar, agarrar, escapar

la mejor vista en la naturaleza

audaz.

Receta para un Cinquain

Línea # 1: Una palabra (nombre) el tema del poema.
Línea # 2: Dos (adjetivos) palabras que describan.
Línea # 3: Tres (verbos) palabras que muestren acción.
Línea # 4: Cuatro palabras que se refieran a los sentimientos.
Línea # 5: Una palabra que repita o se refiera al tema de la primera línea.

Closing (5 minutes)

During this time, allow each cooperative learning group to share their beak design with the rest of the class. Each group should come forward with their beaks attached to their faces, and allow the rest of the class to guess what food this type of bird might eat and how the bird might gather it. Ask the group to explain how their beak designs match their task cards. If the class cannot guess the task right away, provide the class with helpful hints. After the group has been able to explain their beak design, move on to the next cooperative learning group.

Thank students for their good work and cooperation. Tell them that, in the next lesson, they will have an opportunity to read their cinquains, and continue to study animals and how they behave.

Parent Link

Have students bring the beaks home and discuss with their families the process they followed in creating them.

Enlace familiar

Los alumnos llevarán los picos a sus casas para hablar con sus familias sobre el proceso que siguieron para hacerlos.

Handout 12.1

Task Cards

You scoop up small water animals with your beak.	You catch insects with your beak while you are flying.
You catch fish with your beak.	You collect nectar from flowers through your beak.
You tear meat with your beak.	You crack hard seeds with your beak.
You hammer holes in trees with your beak.	You eat soft fruit with your beak.

Hoja de trabajo 12.1

Tarjetas para tareas

Con tu pico recoges pequeños animales del agua.	**Con tu pico recoges insectos mientras vuelas.**
Con tu pico atrapas peces.	**Con tu pico recoges néctar de las flores.**
Con tu pico desgarras carne.	**Con tu pico quiebras semillas.**
Con tu pico haces agujeros en los árboles.	**Con tu pico comes frutas blandas.**

Handout 12.2

World of Animals Cinquain

Line #1 ______________________________

Line #2 ______________________________

Line #3 ______________________________

Line #4 ______________________________

Line #5 ______________________________

Hoja de trabajo 12.2

"Cinquain" del mundo de los animales

Línea #1 ______________________________

Línea #2 ______________________________

Línea #3 ______________________________

Línea #4 ______________________________

Línea #5 ______________________________

Lesson 13

Sensory Signals (Part I)
Señales sensoriales (Parte I)

Overview

In this lesson, students expand their knowledge of animal behavior. They learn how animals are able to send important messages via scent signals. This lesson emphasizes the relationship between animal behavior and animal survival.

Resumen

En esta lección los alumnos aumentan su conocimiento de la conducta animal. Aprenden cómo los animales mandan mensajes importantes por medio del sentido del olfato. Esta lección enfatiza la relación que existe entre la conducta animal y la supervivencia.

Key Skills

Problem-solving
Observing
Inferring
Classifying
Communicating

Destrezas claves

Resolver problemas
Observar
Hacer inferencias
Clasificar
Comunicarse

Preplanning

1. Make charade cards by writing one of the following words on each index card: hot, cold, afraid, angry, happy, hurt, sad, hungry, full, and sleepy.

2. Contact a local store that develops film, and ask them to save 45 plastic 35 mm film containers for the activity. (Fifteen containers will be used for this activity, and 30 for the activity in the next lesson, "Sound Signals.") [You can use pill bottles or baby food jars with lids instead of the containers.]
3. At least a day before the activity, prepare three identical sets of scent containers:
   a. Wet three cotton balls with one scented liquid.
   b. Place each cotton ball inside a film container.
   c. Seal container with lid.
   d. Repeat steps a-c for each scented liquid.
   e. Label the lids and container bottoms with obscure codes such as "V" on the bottom and on the lid for vanilla. Make labels discreet and obscure enough so that students do not focus their attention on matching codes rather than scents.
   f. To transfer the scent on the cotton ball to the lid, shake each container just before using it. Three sets will allow 30 students to participate, 15 "parents" and 15 "babies."
4. Read "Background for the Teacher."
5. Review the following terminology:

**innate behavior*	**comportamiento innato*
**communication*	**comunicación*
**charade*	**charada/acertijo*

Background for the Teacher

The study of animal behavior, ethology, is a complex science. Ethologists apply the principles of ecology, anatomy, physiology, evolution, neurology, endocrinology, and mathematical analysis to their studies. Because ethology depends heavily on findings in other areas, it is a relatively new branch of biology. In 1973, Karl von Frisch, Konrad Lorenz, and Niko Tinbergen won the Nobel Prize in Physiology and Medicine for their studies in animal behavior. Much of their work was done between 1935 and 1950, and is still influencing ethology today.

Ethology requires a careful, detailed observation of animals over a long period of time. When the data are analyzed, the scientist must be careful not to attribute human characteristics to the observed behavior. Attributing human qualities to nonhuman beings or things is called anthropomorphism. It is anthropomorphic to say "My dog is happy to see me." It is more accurate to say: "My dog wagged its tail when I came home."

Animal communication is one aspect of animal behavior that ethologists study. ***Communication** consists of any behavior that functions to convey information from a sender to a receiver. Animal communication is based primarily on sound, scent, touch, and movement. Social animals such as bees, wolves, or monkeys tend to have a greater repertoire of communication mechanisms than solitary animals such as coyotes, bears, and snakes.

These examples illustrate the variety of ways in which animals communicate using sound:

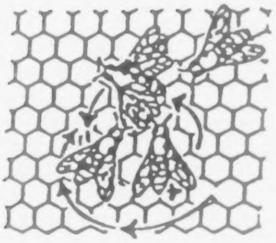
- Male mosquitoes are attracted by the buzzing sound made by the female's wings as she flies. The antennae of the male are covered with hairs that vibrate in unison at this frequency. (They will also fly toward a tuning fork vibrating at the same frequency.) These vibrations stimulate sensory cells at the base of each hair and the mosquito responds by flying toward the sound. These hairs do not stand up enough to vibrate until the male is sexually mature and ready to reproduce.
- Male frogs make sounds that are very species-specific to attract females of their species. However, females only respond when they are ready to reproduce. If a female has already laid her eggs or is immature she will not respond to the call.
- Birds sing for two main reasons: to attract mates and to defend their species. Birdsong appears to be partially ***innate*** and partially learned. A male bird raised in isolation will sing, but the song is not like that of other mature males of its species. If an isolated bird hears its species' song at a certain time during development, it will learn to sing the correct song.
- Whales and dolphins sing elaborate songs. These sounds have been recorded and scientists are still trying to decipher their meaning.

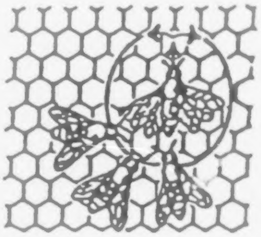
Examples of animals that communicate using scent (or chemicals):

- Deer have special scent glands on their feet and heads that they use to mark paths which they have traveled in the woods.
- The lemur will urinate on its feet so that its scent is left behind as it climbs trees.
- Ants leave a scent along trails to food so they can find their way home and other ants can find the food source. They also produce a special scent to indicate alarm.
- Female moths produce a sex attractant that males detect with their antennae.
- Many adult female animals lick their offspring thoroughly after birth. This action helps the parent learn the unique scent of her offspring.

Examples of animals that communicate using touch and movement:

- Male spiders vibrate the female's web so she will know it is a potential mate, and not prey, that is present.
- Antelope raise their tails and expose their lighter colored rump areas when frightened. This signal alerts the rest of the herd and provides a guide for them to follow. (They also release a warning scent at the same time.)
- Honeybees perform a waggle dance to communicate to other bees where they can find food. When a foraging bee returns to the hive, she gives nectar to other bees, then begins a dance on the vertical face of the hive. A round dance indicates a nearby food source. A figure eight with wiggles in the center indicates a distant food source. The direction of the middle line of the figure eight, relative to the vertical wall of the hive, indicates the angle of the sun at the food source. The speed of the dance is related to the distance of the food source. The slower the bee dances, the farther away the food is. (See Figure 1 below.)





Información para el/la maestro/a:

La etología, el estudio de la conducta animal, es una ciencia compleja. Los etólogos aplican a sus estudios los principios de la ecología, anatomía, fisiología, evolución, neurología, endocrinología y el análisis matemático. Como la etología depende mucho de otras areas de investigación, es una rama de la biología relativamente nueva. En 1973, Karl von Frisch, Konrad Lorenz, y NikoTinbergen recibieron el Premio Nobel en Fisiología y Medicina por sus estudios de la conducta animal. Hicieron una gran parte de su labor entre 1935 y 1950 y hasta la fecha siguen influyendo en la etología.

La etología requiere una observación cuidadosa y detallada de los animales a través de mucho tiempo. Cuando se analizan los hechos, el científico debe tener cuidado de no atribuir características humanas a la conducta observada. El hecho de atribuir cualidades humanas a las cosas o a los seres no humanos se

llama antropomorfismo. Sería antropomórfico decir "Mi perro está felíz de verme". Sería más correcto decir "Mi perro movió la cola cuando llegué a la casa".

La comunicación animal es un aspecto de la conducta animal que estudian los etólogos. La ***comunicación*** consiste en cualquier conducta que lleve información del que la manda al que la reciba. La comunicación animal se basa principalmente en el sonido, el olor, el tacto y el movimiento. Los animales sociales como las abejas, los lobos o los monos tienen más mecanismos de comunicación que los animales solitarios como los coyotes, los osos, o las víboras.

A continuación hay algunos ejemplos que ilustran varias maneras de comunicación por medio de sonido entre los animales:

☆ Al mosquito macho le atrae el zumbido de las alas de la hembra al volar. Las antenas del macho están cubiertas de pelos que unidos vibran a esta frecuencia. (También volarán hacia un instrumento de afinar que vibre a la misma frecuencia). Estas vibraciones estimulan a las células sensoriales en la base de cada pelo y la respuesta del mosquito es volar hacia el sonido. Estos pelos no se paran para vibrar sino hasta que el macho esté sexualmente maduro y listo para la reproducción.

☆ Entre las ranas, los machos hacen sonidos muy específicos a su especie para atraer a las hembras. Pero las hembras responden sólamente cuando están listas para la reproducción. Si la hembra ya ha puesto sus huevos, o es inmadura, no hará caso a la llamada.

☆ Los pájaros cantan por dos razones principales: para atraer a la pareja y para defender su especie. Su canto parece ser parcialmente innato y parcialmente aprendido. Un pájaro macho que se cría aislado canta pero su canto no es como el de los demás machos maduros de su especie. Si un pájaro aislado escucha el canto de su especie durante cierto momento de su desarrollo, aprenderá el canto correcto.

☆ Las ballenas y los delfines tienen cantos complejos. Estos sonidos se han grabado y los científicos aún están tratando de descubrir su significado.

Ejemplos de animales que se comunican por el olor (o substancias químicas):

☆ Los venados tienen glándulas de olor especiales en la cabeza y los pies que usan para marcar los caminos que han tomado por el bosque.

☆ El lemur orina en sus patas, para ir dejando su olor al treparse a los árboles.

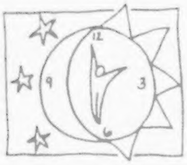
☆ Las hormigas dejan un olor camino al alimento para que puedan regresar al hogar y para que las demás hormigas puedan encontrar el alimento. También producen un olor especial como alarma.

☆ La polilla hembra produce un atrayente sexual que el macho detecta con sus antenas.

- Muchas hembras lamen completamente a sus crias recién nacidas. Esto ayuda a la madre a conocer el olor especial de su cría.

Ejemplos de animales que se comunican por el tacto y el movimiento:

- La araña macho vibra la telaraña de la hembra para que ella sepa que está presente una posible pareja y no una presa.
- Cuando los antílopes están asustados paran la cola y presentan la parte trasera más clara. Esta señal avisa al resto de la manada y les sirve de guía para seguir. (Al mismo tiempo también emiten un olor de aviso).
- Las abejas danzan para comunicar a las demás dónde hay alimento. Cuando una abeja regresa a la colmena, les da néctar a las demás y luego comienza a danzar en la pared vertical de la colmena. Una danza circular indica que hay alimento cerca. Una danza en figura de 8 con movimientos al centro indica que el alimento está lejos. La dirección de la línea central del 8 relativa a la pared vertical de la columna indica el ángulo del sol en el lugar del alimento. La velocidad de la danza también indica distancia. Mientras más despacio danze la abeja, más lejos estará el alimento. Si la danza es en figura de 8 con movimientos del abdomen, las abejas buscarán más lejos.



Suggested Time

10 minutes—Welcoming
45 minutes—Homework/Learning Options
20 minutes—What Signal
10 minutes—Guided Discussion
20 minutes—Sound Signals
10 minutes—Debriefing
5 minutes—Closing

2 hours total

Materials

A teacher can conduct this lesson alone, if necessary. You will need the materials listed:

For first activity:

- 10 3"x5" index cards and a marker.

For second activity:

- 5 strongly-scented nontoxic liquids, such as vanilla, peppermint extract, almond extract, lemon juice, and vinegar.
- 15 cotton balls.

- 15 film containers with lids.
- Fine-point markers.

Suggested Quote/Cita sugerida

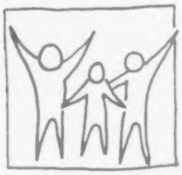
The endangered are not species.
The endangered is "beauty,"
Unfrozen.

—Bernice Zamora, as quoted in *The Fire in Our Souls*

Ms. Zamora is a Chicana poet whose collection, *Restless Serpents*, is one of the seminal works of Chicana poetry.

Lo que está en peligro de extinción no son las especies. Lo que está en peligro de extinción es la "belleza" natural.

—Bernice Zamora



Welcoming (10 minutes)

Welcome students and take attendance. Assign a few students to handle the attendance and weather charts. Provide an introduction to this lesson by asking students how they would send an important message to someone if they couldn't write or talk. Remind them that animals need to communicate with other animals but cannot talk or write.

Homework/Learning Options (45 minutes)

Students may use this time to complete homework, engage in free reading, or do any other program-related academic activity. Today, you can open it by having students first read the cinquains they wrote during the previous lesson.

Curriculum

What Signal? (20 minutes)

Ask students if anyone has played the game "charades." Let students who have played charades remind the class how the game is played. Emphasize that the object is to help the rest of the class guess what word is being acted out without speaking or writing.

Divide the class into groups of two or three students. Distribute a charade card (index card) to each group. Give the group two minutes to decide how to act out the words on the card. Give each group one minute to act out its word for the rest of the class.

Ask the class:

"What did each team do to help you guess the correct word? What would have improved your chance of guessing the right word?"

¿Qué señal es esta?

Divida la clase en grupos de 2 a 3 estudiantes. Cada grupo recibe una tarjeta con un sentimiento que tiene que actuar (sin hablar) hasta que los demas adivinen cuál sentimento están interpretando. Permitale a los grupos algunos minutos para que puedan decidir como van a actuar su sentimiento o palabra.

Pregunte a los alumnos:

"¿Qué hizo cada equipo para ayudarles a adivinar la palabra correcta? ¿Qué otra cosa les hubiera ayudado más a adivinar la palabra correcta?"

Rationale...

This activity allows students to make the connection between human and animal behavior. It is important that this relationship be understood before students explore the many ways in which animals communicate.

Razón fundamental...

Esta actividad permite a los alumnos hacer la conección entre la conducta humana y la conducta animal. Es importante que comprendan esta relación antes de estudiar las muchas maneras que usan los animales para comunicarse.

Continue playing charades until every group has had an opportunity to act out a word. If you have few students, allow groups to act out a couple of words each.

Guided Discussion (10 minutes)

Tell students:

"By using facial expressions, body movements, and skits, the teams sent messages, or signals, to the rest of the class. Although most ***communication*** between humans is verbal (using written or spoken words), humans can also ***communicate*** a lot of information nonverbally (without words)."

"How do you know when your parents or your teachers are in a 'good' or 'bad' mood? Do you know this from verbal or nonverbal messages? How do animals ***communicate***? What is the difference between the way animals and humans communicate?"

Diga a los alumnos:

"Usando expresiones faciales, movimientos del cuerpo y dramatizaciones, los equipos le enviaron mensajes o señales a los demás. Aunque la mayor parte de la comunicación entre los humanos es verbal (usando palabras escritas o habladas), también pueden comunicar mucha información de una manera no-verbal (sin palabras)".

"¿Cómo saben ustedes cuando sus padres o sus maestros están de mal humor? ¿Lo saben por los mensajes verbales o no verbales? ¿Cómo se comunican los animales? ¿Cuáles son algunas de las diferencias entre la comunicación animal y la comunicación humana?"

Tell students:

"A major difference between nonhuman animal communication and human communication is that humans think, or reason, about what they are communicating. People are capable of learning to communicate and to respond to signals differently under different conditions. Some animals do not think about communication. They are born knowing a certain way to communicate. If an animal is born being able to respond in a certain way, this response is ***innate behavior*."

Dígale a los alumnos:

"Una diferencia importante entre la comunicación animal y la humana es que los seres humanos pueden pensar or razonar acerca de lo que están comunicando. La gente puede aprender a comunicarse y responder a ciertas señales de diferentes maneras en diferentes condiciones. Algunos animales no piensan en comunicarse. Nacen ya con cierta manera de comunicarse. Si un animal ya nace sabiendo responder de cierta manera, esta respuesta se llama ***comportamiento innato*".

Ask students to describe how they think animals communicate.

Explain to students:

"Animals send messages by smells, sounds, light signals, or specialized movements to communicate information about food, water, shelter, space, mating, or predators. (Some examples include when a baby animal is hungry, when an animal claims a space as its territory, when an animal is looking for a mate, or when a predator is approaching.)"

Explique a los alumnos:

"Los animales transmiten mensajes a través del olor, el sonido, señales de luz, o movimientos especializados para comunicar información acerca de alimento, agua, refugio, espacio, apareo, o animales rapaces".

Scent Signals (20 minutes)

Tell students that they are going to simulate how animals send scent messages by playing the "Scent Matching Game."

Divide the class into two groups. Give each student in one group one of the 15 scent container bottoms. These students will be the animal "parents." Give each student in the second group a scent container lid. These students will be the animal "babies."

Tell students:

"The group of animal 'parents' must stand around the sides of the room. The group of animal 'babies' must find an animal parent of the same scent in order to survive. When I give the command both groups—parents and babies—will begin the search for one another. You will have five minutes to move around and match scents. When a baby finds a matching parent, baby and parent will both sit down."

At the end of the game, determine how many babies survived by checking whether the codes on the container's lid and bottom match. Collect the scent containers.

Díga a los alumnos:

"El grupo de los 'padres' de los 'animalitos' deben estar parados alrededor del salón. Para sobrevivir, el grupo de animalitos tiene que encontrar a un padre que tenga el mismo olor. Cuando yo dé la señal los dos grupos—padres y animalitos—empezarán a buscarse. Tendrán cinco minutos para moverse y emparejar olores. Cuando un animalito encuentre a su padre del mismo olor, los dos se sentarán".

After the class is seated, tell students:

"In nature, each parent recognizes its own baby by the baby's individual and unique scent. For example, all baby seals smell like seals, but a specific mother seal can recognize her baby by its own special scent. The same is true for penguins. If a baby penguin goes to the wrong parent, the baby will be pecked."

Dígale a los alumnos:

"En la naturaleza, cada padre reconoce a su bebé por su olor individual y único. Por ejemplo, todas las focas pequeñas tienen el mismo olor, pero cada madre foca puede reconocer a su propia cria por su olor especial. Con los pingüinos pasa lo mismo; si una cria trata de juntarse con el padre equivocado, el adulto lo picoteará".

Debriefing (15 minutes)

Discuss the game with students. Ask if they thought it was hard or easy. Ask if they think humans or nonhuman animals have a keener sense of smell. Ask if they know of any animals that use scent messages.

Tell students:

"There is recent evidence that humans use scent information more than we realize. Human mothers can recognize their children this way, just as animals can."

Dígale a los alumnos:

"Ultimamente hemos aprendido que los seres humanos se valen de la información del olfato más de lo que creíamos. Igual que los animales, los padres humanos también pueden reconocer a sus hijos por su olor".

Challenge students to design an experiment testing their ability to recognize individuals by scent. Share other examples of animals that use scent to communicate (use information provided in "Background for the Teacher.")

Closing (5 minutes)

In closing, ask students if they can think of any other way, besides scent, that animals might communicate. (If students do not come up with "sound" as a means of communication, offer this as a possible method.)

Parent Link

Family "Nature Walk" Journals. During this and the next lesson, have parents and students take a walk around their neighborhoods to explore the different types of birds who live there. Students can list these birds, draw their pictures, describe them with words, and/or look up facts about them in reference books, and bring them to class. It would be interesting to see what birds exist in different neighborhoods, and even in different Academia sites. The different ecologies of a large city compared to those of a small town could be interesting to discuss in a letter to an Academia "Sister Site." Encourage students to add to their family journals on a regular basis; perhaps adding leaves and blooms to their journals to learn more about trees and plants, etc.

Enlace familiar

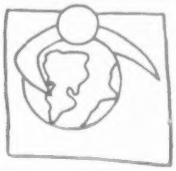
Diario familiar de caminatas en la naturaleza. Durante ésta y la próxima lección, los padres y alumnos harán una caminata alrededor de sus vecindarios para estudiar los diferentes tipos de pájaros que viven allí. Los alumnos pueden hacer una lista de los pájaros, dibujarlos, describirlos con palabras o ver datos acerca de ellos en libros de referencia y llevar estos a la clase. Sería interesante ver qué tipo de pájaros existen en los diferentes vecindarios y en los diferentes centros de la Academia. Sería interesante escribir una carta para conversar sobre las diferentes ecologías que existen en una ciudad grande comparadas a un pueblo pequeño y enviárselas a otro centro de la Academia. Incentive a los alumnos para que añadan regularmente a sus diarios familiares hojas y flores para aprender más acerca de los árboles, plantas, etc.

Literature Link

Two of Joseph Bruchach's stories from the collection cited earlier, *Keepers of the Animals: Native American Animal Stories*, are wonderful links for this lesson. "The First Flute" is a story from the Lakota people of the plains about the making of the first flute, and one way in which sound is used for communication. "Monabozho and the Woodpecker" is a magical Anishenabe story about fighting fever and respecting "bird people."

Lesson 14

Sensory Signals (Part II)
Señales sensoriales (Parte II)



Overview

This lesson continues to explore how animals communicate, focusing on sound as a means of animal communication. Students apply this knowledge of animal behavior through an activity which demonstrates how sound mechanisms are used for survival.

Resumen

Esta lección, cuyo enfoque es el sonido, continúa la investigación de como se comunican los animales. Los alumnos aplican sus conocimientos de la conducta animal en una actividad que demuestra cómo los animales se valen de los mecanismos de sonido para sobrevivir.

Key Skills

Problem-Solving

Observing

Inferring

Classifying

Communicating

Destrezas claves

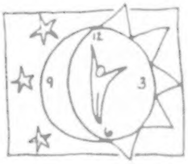
Resolver problemas

Observar

Hacer inferencias

Clasificar

Comunicar



Suggested Time

5 minutes—Welcoming

45 minutes—Homework/Learning Options

25 minutes—Sound Signals

10 minutes—Debriefing
30 minutes—Sending Signals
5 minutes—Closing

2 hours total

Preplanning

1. Prepare enough pairs of noisemakers so that all students can participate in the game. These directions assume a class of 30 students; adjust as necessary. It is acceptable to have multiple pairs that make the same noise. Possible pairs of noisemakers include: paper clips, three in each of six containers; pennies, two in each of six containers; marbles, one in each of six containers; popcorn kernels, two in each of six containers; macaroni pieces, four in each of six containers.
2. Make sure each kind of noisemaker sound is distinguishable from that of every other noise maker. Separate the pairs of noise makers into two sets as you prepare them.
3. Store each of the two sets of noise makers separately.
4. Hide the container of stickers or treats somewhere in the classroom and count steps from this hiding place to the front of the classroom. (Remember the number of steps—you need this number to perform "Dance of the Bees!")
5. Review the following terminology:

**mate*	**pareja*
**offspring*	**cria*
**reproduce*	**reproducir*
**innate*	**innato*

Materials

A teacher can conduct this lesson alone, if necessary. You will need:

For first activity:

- 30 film containers and lids.
- Small numbers of different items (paper clips, pennies, popcorn kernels, macaroni pieces, and marbles) that will fit into the film containers and make dissimilar sounds when shaken.

For second activity:

- Stickers, or other small treats, hidden in an envelope or in a container marked "nectar" (one treat for each student).

Suggested Quote/Cita sugerida

The endangered are not species.
The endangered is "beauty,"
Unfrozen.

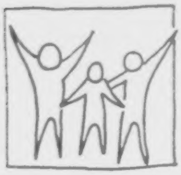
—Bernice Zamora, as quoted in *The Fire in Our Souls*

Ms. Zamora is a Chicana poet whose collection, *Restless Serpents*, is one of the seminal works of Chicana poetry.

Lo que está en peligro de extinción no son las especies. Lo que está en peligro de extinción es la "belleza" natural.

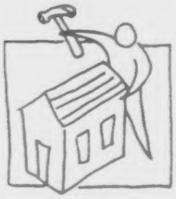
—Bernice Zamora

SESSION PLAN



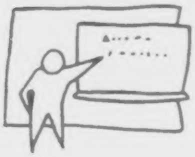
Welcoming (5 minutes)

Greet students and take attendance. Assign students to the various tasks of graphing attendance and charting weather or temperature. Review the ways in which animals communicate using scent. Tell students that today they will learn about another way animals communicate using sound.



Homework/Learning Options (45 minutes)

Students should use this time to complete any homework assignments, engage in free reading, or receive individualized tutoring.



Curriculum

Sound Signals (25 minutes)

Tell students that they are going to simulate how animals send sound messages by playing the "Sound Matching Game." Tell students to pretend that they are an adult animal that lives in a large forest and that many other species of animals live in this same forest. This animal wants to find other adult animals of its same kind. Tell students that they are looking for a mate, another animal of its same species.

Challenge students by saying:

"Try to find a ***mate*** of the same species by matching ***mating calls*** you hear in this forest. You will need to move quietly without talking so that every animal can compare ***mating calls***."

Diga a los alumnos:

"Traten de encontrar la pareja de su misma especie formando pares con los llamados que escuchen en este bosque. Tendrán que moverse en silencio para que cada animal pueda comparar los llamados".

Have students who were animal babies in the last activity stand around the sides of the room as far apart as possible. Distribute one set of sound containers to these students, and have them shake the containers gently. Then, give containers (matching set) to students in the second group, who should be standing in the center of the room.

Explain that:

"Each group has sound containers that match with the other group. When I give the signal, you will all walk around at the same time. Listen carefully, and match sounds. When any two of you find a match, you both must sit down. Remember to shake the containers, rather than open them, to find a 'sound match.' You have five minutes to find a match."

Explique a los alumnos:

"Cada grupo tendrá envases cuyo sonido empareja con el sonido de los embases del otro grupo. Cuando yo dé la señal, todos van a caminar al mismo tiempo, escuchando con cuidado, para buscar los pares. Cuando alguien encuentre a su pareja, los dos se sientan. Para encontrar a su 'pareja de sonido', hay que mover los envases sin tener que abrirlos. Tendrán cinco minutos para encontrar a su pareja".

At the end of the game, determine how many animals found a mate by opening the container and checking to see whether the contents match. Collect the sound containers.

Debriefing (10 minutes)

Ask students if they know of any animals that use sound messages. Share examples provided in "Background for the Teacher," Lesson 13.

Tell students that "finding a ***mate**, or a match, is necessary for animals to ***reproduce**—to have ***offspring**. Animals need to have babies or offspring, in order to keep their species alive. Therefore, it is very important that they have a way to communicate to other animals of the same species."

Diga a los alumnos:

"Los animales tienen que encontrar una pareja para poder ***reproducirse**— tener ***crías**. Los animales tienen que tener crías para mantener su especie. Por eso es muy importante que se puedan comunicar con los demás animales de su propia especie".

Sending Signals (30 minutes)

In this activity, the teacher will act out a modified version of the "Dance of the Bees," and lead the students to "nectar." Begin by asking students how they think bees find nectar, and tell other bees about the nectar they found. Tell students that bees do not use sound or scent, but movement, to communicate a message.

Explain that:

When a worker honeybee returns to the hive, she does a special dance on the walls of the hive to communicate the distance and direction of the source of food or nectar to the other bees. (Worker bees are non-reproductive female bees.)

Pretend that you are bees in a hive. I will play the role of a worker bee who has found nectar and has returned to the hive. Try to interpret the message that I am communicating in my dance. If you figure it out, you will be able to discover some hidden treats in the classroom.

Explique que:

Cuando un abeja obrera que produce miel regresa a la colmena, ésta danza de una manera especial en las paredes de la colmena para comunicarles a las demás abejas dónde y a qué distancia está el néctar. (Las abejas obreras hembras no son abejas reproductoras).

Hagan de cuenta que son abejas en una colmena. Yo voy a ser una abeja obrera que ha encontrado néctar y regresa a la colmena. Traten de interpretar el mensaje que estoy comunicando con mi danza. Si pueden interpretarlo, van a descubrir dónde hay unas sorpresas escondidas .

Quotes from the Field . . .

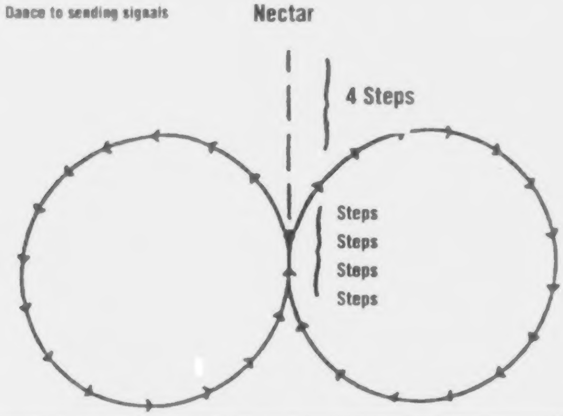
"The bee dance started off with a laugh 'to see the teacher dance.' But, I enjoyed doing it and they picked up on the cues as I gave them questions. I used stickers and they said they would have preferred candy! Then, Herbert wanted to try doing the dance and did it successfully with a little help."

—Monica Incerti, Centro Latino de San Francisco

Perform the dance as follows:

1. Move in a large, rounded figure eight. Make sure that the middle run of the figure eight points in the direction in which the "nectar" is hidden. (The prize you hide before the lesson.) (See figure 1 below.)
2. When you are in the middle of the figure eight, face the nectar, and stamp your feet as many times as there are steps to the nectar.

Figure 1



3. After you have performed the dance several times, ask students what they have observed. If they are having trouble, ask them the questions that follow to assist them in figuring out the meaning of the dance. Perform the dance after each question. Encourage the students to test their ideas as they try to solve the puzzle.

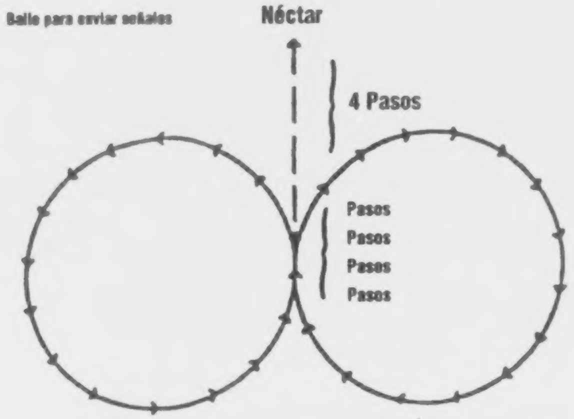
Ask them:

- ☆ In which direction am I facing?
- ☆ How many times am I stamping?
- ☆ What could these codes stand for?

Haga el baile de la abeja como a continuación:

1. Muevase en la dirección de una figura de ocho grande. Asegurese de que la parte media por donde corre el centro de la figura ocho apunte en la dirección donde ha escondido el "néctar" (o sea, el premio que usted escondió antes de la lección). [Refierase a la Figura 1].
2. Cuando esté en el medio de la figura ocho, posicionese frente al néctar, y dele al suelo con sus pies el número de veces equivalentes al número de pasos que tendría que tomar antes de llegar al néctar.

Figura 1



3. Después que haya hecho el baile de la abeja varias veces, preguntele a los estudiantes lo que han observado. Si tienen dificultad, hagale las preguntas a continuación para ayudarles a identificar el significado del baile. Aníme a los alumnos a tratar de probar sus ideas a la vez que tratan de adivinar este rompecabezas.

Pregunte a los alumnos:

- ☆ ¿Hacia qué dirección estoy mirando?
- ☆ ¿Cuántas veces estoy pateando?
- ☆ ¿Qué querrán decir estas señales?

Provide students with hints and guidance until they uncover the treats you have hidden. While they are enjoying their treats, ask them how they think the bees know how to perform or interpret the dance [****innate behavior***].

Explain:

"No one teaches the bees how to do this. They are born knowing this. It is ****innate behavior***. It does not have to be learned."

"If the bees do not understand the message of the dance, they will not find the flowers and they will not have any food."

Explique:

"Nadie les enseña a las abejas a hacer esto. Ellas nacen sabiéndo como hacerlo. Es un comportamiento ****innato***. No tienen que aprenderlo".

"Si las abejas no entienden el mensaje de la danza, no podrán encontrar las flores y no tendrán comida".

Extension Activity

As an extension to this lesson, allow students to explore the concept of sound as a means of animal communication. How does sound lend itself to communication? Do animals use sound for other things besides communication? Lead a discussion that describes the way in which some animals use echoes to find their way. For example, bats fly at night—in the dark—and use echoes to find their way. Bats send out short, fast clicking noises as they fly. When the clicking sound is reflected off something such as a tree, another bat, or an insect, the bat uses its large ears to tell what kind of object has made the echo, how far away it is, and where it is located. Porpoises, dolphins, and killer whales use echoes in the ocean as bats do in the air. These underwater animals make sounds at a higher pitch than bats, but use the echoes that come back in a similar way. From their use of echoes, they can tell where to swim to go toward an object or away from it.

Allow students to experiment with sound and echoes by yelling into large cans (e.g., coffee cans) with one end removed, standing approximately 5 centimeters away. What do students hear when they yell "Hello!" into the can? Have students yell "Hello!" in the same volume without the can. "Which sounds louder? Why can't an echo be heard in this case? ["You cannot hear an echo because you are too close to the can. What you hear is the sound of your voice plus the sound of your voice bouncing back at you at almost the same time."] "When a sound is reflected off of something like walls, or it is bounced back, the sound is called an echo. An echo is a sound you hear after it is reflected from some object. If you move close to the object, the sound of your voice and the sound of the reflection can almost run together." Continue experimenting by asking students to make holes in the end of the can (use a nail and a hammer). "Any difference?" [Yes, some of the sound passed through the holes instead of bouncing off the bottom. Since not as much sound could bounce back, the sound they heard was not as loud as before.]

"Now, help students remove the other end. What is heard when 'Hello!' is yelled into the can?" [Now, there is even less surface from which the sound could bounce, so the volume of this yell should seem very low.] What happens if students yell into a can with one end intact and with a soft material, like a dish towel, at the end? [The towel absorbs the sound, so very little sound is reflected back.] Ask students to replace the towel with aluminum. [Sound reflects well off of surfaces that are smooth and hard like aluminum foil. An echo is heard.]

(* These exercises, and information about them, were extracted from WonderScience.)

Actividad de extensión

Como extensión a ésta lección permita a los alumnos explorar el concepto de sonido como forma de comunicación de los animales. ¿Cómo se usa el sonido para la comunicación? ¿Usan los animales el sonido para otras cosas aparte de la comunicación? Diriga una discusión que describa la forma en que algunos animales usan ecos para encontrar el camino. Por ejemplo, los murciélagos vuelan en la obscuridad de la noche y usan ecos para encontrar el camino. Los murciélagos emiten ruidos cortos y chasquidos rápidos al volar. Cuando el chasquido se refleja en algo como un árbol, otro murciélago o un insecto, el murciélago usa sus orejas largas para saber qué tipo de objeto a emitido el eco, a qué distancia se encuentra y donde está localizado. Las marsoplas, delfines y ballenas usan ecos en el océano como los murciélagos lo hacen en el aire. Estos animales acuáticos hacen sonidos más fuertes que los murciélagos pero usan ecos que responden en la misma forma. Por el uso de ecos ellos pueden saber hacia donde nadar para encontrar el objeto o alejarse de el.

Permita a los estudiantes experimentar con sonidos y ecos gritando dentro unas latas grandes (por ejemplo, latas de café) que tengan un lado abierto, parados aproximadamente a unos 5 centimetros de distancia. ¿Qué es lo que los estudiantes escuchan cuando gritan "hola" dentro la lata? Diga a los estudiantes que griten "hola" con el mismo tono de voz sin la lata. "¿Cuál de los sonidos es

más fuerte? ¿Por qué el eco no se puede escuchar en este caso?" ["No puedes escuchar el eco porque estás muy cerca de la lata. Lo que escuchas es el sonido de tu voz en adición el rebote de tu voz volviendo hacia tí al mismo tiempo"]. "Cuando el sonido se refleja en algo como una pared o rebota el sonido se llama eco. Un eco es un sonido que se ecucha después de que se refleja en algún objeto. Si te mueves cerca del objeto el sonido de tu voz y de la reflexión pueden emitirse casi al mismo tiempo." Continúe experimentando. Pida a los estudiantes que hagan huecos en los lados de las latas (usando clavos y martillos). "¿Hay alguna diferencia?" [Sí, algunos de los sonidos pasan por medio de los huecos en lugar de rebotar del fondo. Puesto que no hay mucho sonido que pueda rebotar, el sonido que ellos escuchan no es tan fuerte como el que escucharon antes].

Ahora ayude a los estudiantes a quitar el otro lado de la lata. ¿Qué es lo que escuchan cuando gritan "hola" dentro la lata? [Ahora hay menos superficie contra la cual puede rebotar el sonido, por esto el volumen del grito es muy suave]. ¿Qué pasa sí los estudiantes gritan dento de la lata que tiene un lado cubierto con material suave por dentro como una toalla de cocina? [La toalla absorbe el sonido y por eso refleja de vuelta un sonido muy suave]. Diga a los estudiantes que reemplacen la toalla con papel aluminio. [El sonido se refleja muy bién de las superficies que son planas y duras como el papel aluminio. Es por eso que se escucha un eco].

(* Este ejercicio e información acerca del eco fueron extraídas de la actividad de WonderScience.)

Closing (5 minutes)

In closing, review some of the ways students have learned that animals communicate. Ask students if they can give any examples of animals that send messages through scent, sound or movement. As an introduction to Lessons 15 and 16, ask students if they could imagine what would happen if animals were not able to communicate. What would happen if people were not able to communicate with one another?

Parent Link

Please refer to previous Parent Link, Lesson 13.

Enlace familiar

Por favor refiérase al Enlace familiar de la Lección 13.

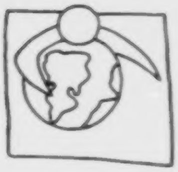
Literature Link

Explore the sounds of animals in *Joyful Noise: Poems for Two Voices* by master poet and inventor of the form, Paul Fleischman. Recommended for kindergarden and up.

200

Lesson 15

Paradise Paved
El paraíso pavimentado



Overview

Approximately, 99.999 percent of all organisms that have ever lived are now extinct. In fact, it is the fate of all organisms, including humans, to go ***extinct**. ***Extinction** usually results from natural processes. Increasingly, however, humans, rather than natural causes, create the environmental changes that drive organisms to extinction. In this activity, students will study ***endangered** animals, and discuss ways in which they might help reverse changes that harm animals. This lesson, and Lesson 9, use activities which were developed by the National Science Foundation for National Science and Technology Week, 1990.

Resumen

Aproximadamente 99.999 por ciento de los organismos que vivieron hace mucho tiempo ahora se han extinguido. De hecho, este es el destino que corren todos los organismos incluyendo los seres humanos, o sea la ***extinción**. La extinción usualmente es el resultado de un proceso natural. Cada vez más, los seres humanos y no las causas naturales son los que crean los cambios ambientales que llevan a los organismos a la extinción. En esta actividad, los alumnos van a estudiar a los animales que están en peligro de extinción, tambien discutirán los medios por los cuales podrían ayudar a invertir los cambios que hacen daño a los animales. Esta lección y la Lección 9 utilizan actividades desarrolladas por el National Science Foundation para la Semana Nacional de Ciencias y Tecnología, 1990.

Key Skills

Analyzing
Experimenting
Making inferences
Observing
Predicting
Role-playing
Simulating

Destrezas claves

Analizar

Experimentar

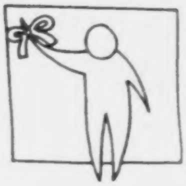
Hacer inferencias

Observar

Hacer predicciones

Hacer representaciones

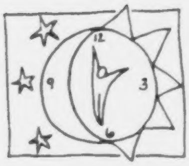
Simular



Preplanning

1. Locate a grassy area approximately five meters square, and a paved area of the same size. [This activity may be done indoors, if weather or space constraints make it necessary. Instead of locating a grassy area outdoors use a large piece of green fabric or paper indoors. You may also choose to focus on the advantages of a different color toothpick that matches your classroom flooring.]
2. Divide the toothpicks into two bags of 600 toothpicks each. Be sure that each bag contains 150 of each color.
3. Review the following terminology:

***endangered**	***en peligro**
***extinction**	***extinción**



Suggested Time

10 minutes—Welcoming
45 minutes—Homework/Learning Options
20 minutes—Guided Discussion
25 minutes—Paradise Paved
10 minutes—Debriefing
10 minutes—Closing

2 hours total

Materials

The help of a teaching assistant is strongly recommended for this activity. The activity requires going outdoors, and the use of a time-keeper. You will need:

☆ 1200 colored toothpicks, (300 each of red, yellow, green, and blue).

☆ 2 plastic bags, 4 stakes, chalk and string.

☆ A watch with a second hand.

Suggested Quote/Cita sugerida

The endangered are not species.
The endangered is "beauty,"
Unfrozen.

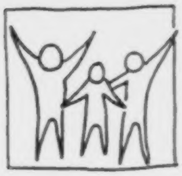
—Bernice Zamora, as quoted in *The Fire in Our Souls*

Ms. Zamora is a Chicana poet whose collection of poetry, *Restless Serpents*, is one of the seminal works of Chicana poetry.

Lo que está en peligro de extinción no son las especies. Lo que está en peligro de extinción es la "belleza" natural.

—Bernice Zamora

SESSION PLAN

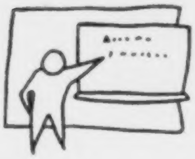


Welcoming (10 minutes)

Welcome students and take attendance. Choose students to chart attendance and the weather. Tell students that in this lesson, and the next, they will be learning about something that often happens in nature for one reason or another: animals die before they can have offspring or children. If there aren't young animals that will grow up to have offspring, then, in time, there will be no more of these animals. Ask the class if they can think of an example of a kind of animal that doesn't live anymore [dinosaurs, for example].

Homework/Learning Options (45 minutes)

Students should use this time to complete any homework assignments or to receive individualized tutoring.



Curriculum

Guided Discussion (20 minutes)

Ask students:

"How many of you like animals and like to read stories, or watch television programs about animals? Have you noticed what all the animals that you have seen need in order to live? What are those things?"

After the first few answers, categorize the responses into five groups on the blackboard. Label these groups: Food, Water, Shelter, Space, and Air. Then ask students what the similarities are between the needs of humans and animals. What are differences?

Pregunte a los alumnos:

"¿A quiénes les gustan los animales, leer cuentos o ver programas de televisión acerca de ellos? ¿Se han fijado en las cosas que necesitan todos los animales para poder vivir? ¿Cuáles son?"

Despues que reciba las primeras respuestas categorízelas en cinco grupos en la pizarra. Marque cada columna con las siguientes categorías: Comida, Agua, Albergue, Espacio, Aire.

Tell them:

"Both people, and other animals, share the earth and need places where they find food, water, shelter, space, and air. Could you live if you had lots of food, shelter, space, and air, but no water?" Repeat the question, each time changing the resource that might be limited, until you have asked five questions.

Diga a los alumnos:

"Los seres humanos y los demás animales comparten la tierra, en los lugares en donde encuentran alimento, agua, vivienda, espacio y aire. ¿Podrían ustedes vivir si hubiera suficiente comida, vivienda, espacio y aire, pero no hubiera agua?" Repita la pregunta y cada vez que lo haga cambie el recurso hasta que termine con cinco preguntas.

Tell students:

"No matter how much of one resource people have, they must have all five to live. Other animals also need all five resources to live."

"Because humans need resources, they often make changes or make decisions that ***endanger** other animals. To get these resources, humans make changes or decisions that use, poison or pollute the food or water other animals need. Sometimes these changes also destroy the shelter or space that animals need, and injure or kill the animals. Whales, wolves, sea turtles, bald eagles, bats, and bears are all examples of ***endangered** animals. Animals are ***endangered** when there are very few of them still alive. These animals are ***endangered** because there are not enough of the resources they need to survive, or because humans have made decisions that are putting the survival of these animals in danger."

Diga a los alumnos:

"Aunque la gente tenga una gran cantidad de un sólo tipo de recurso, todos necesitamos tener los cinco tipos de recursos para poder vivir. Los demás animales también necesitan los cinco tipos de recursos para poder vivir".

"Como los seres humanos necesitan recursos, muchas veces hacen cambios que ponen en peligro a los animales. Los seres humanos hacen cambios que envenenan o contaminan la comida o el agua que necesitan los animales. A veces, estos hacen cambios que destruyen el refugio o espacio que necesitan los animales para vivir, los lastiman o los matan. Las ballenas, los lobos, las tortugas de mar, las águilas, los murciélagos y los osos son animales que están *en peligro de extinción. Decimos que los animales están *en peligro de extinción cuando quedan muy pocos de ellos, y es posible que su especie deje de existir. Estos animales están *en peligro de extinción porque hay escasez de los recursos que necesitan para sobrevivir o porque los seres humanos han tomado decisiones que ponen en peligro la supervivencia de estos animales".

Paradise Paved (25 minutes)

Take students to a grassy area, and mark off a square with five-meter sides using corner stakes and string for the sides. Ask students to stand at the edge of the square. Scatter 600 colored toothpicks onto the grass square. Instruct students to enter the square, and to collect all the toothpicks that they can find in 30 seconds. After 30 seconds, ask students to return to their places at the edge of the square.

Tell them:

"Divide the toothpicks into four groups by color. Count the number of toothpicks of each color. In which color group do you have the most toothpicks?"

El Paraiso Pavimentado

Lleve a los estudiantes a un lugar que tenga grama y marque un área cuadrada con lados que midan cinco metros usando varitas para las esquinas y cordón para los lados. Pídale a los estudiantes que se paren al borde del área cuadrada. Riegue 600 palillos de dientes de diferentes colores dentro del área cuadrada. Pídale que se entren al área cuadrada y que recogan todos los palillos de dientes que les sea posible en 30 segundos. Después de que pasen los 30 segundos, pídale que se regresen a su puesto fuera del área cuadrada (o sea, al borde de esta área).

Diga a los alumnos:

"Dividan los palillos de diente en cuatro grupos de acuerdo al color. Cuenten el número de palillos de diente de cada color. ¿De qué color es el grupo que contiene más palillos de diente?"

Allow children to count the number of toothpicks they have of each color, and to give responses. (Students are likely to pick more yellow and red toothpicks than green and blue ones. They should have collected the fewest green toothpicks.)

Tell them:

"Pretend that the toothpicks are caterpillars that live in grassy areas and that you are birds that eat caterpillars. Which caterpillar color was the hardest to find? The caterpillars that were green like the grass were the hardest to find. Do you think that this is an advantage for green caterpillars?" Collect the toothpicks from the students and those still left in the grass.

Move to an area that is paved with asphalt or concrete. Using chalk, mark off a square five meters on a side, and ask students to stand at the edge of the square. Scatter the second set of 600 colored toothpicks on the paved area. Tell them, "Now, you are birds and you are to eat all the caterpillars that you can find in 30 seconds!"

Diga a los alumnos:

Después de permitir que cuenten el número de cada color de palillos de dientes que tienen, dígale a los alumnos: "Vamos a hacer de cuenta que los palillos son orugas que viven donde hay mucha hierba y que ustedes son pájaros que se alimentan de orugas. ¿Qué color de oruga fue la más difícil de encontrar? Las orugas verdes son del mismo color que la hierba y por eso fueron las más difíciles de encontrar. ¿Ustedes creen que esto es una ventaja para las orugas verdes?" (Es muy probable que los estudiantes terminen por recoger más palillos de dientes amarillos y rojos que de los colores verde y azúl. De todos los colores, el número menor de palillos que recogieron debe haber sido de color verde).

Mudese a un lugar que esté pavimentado con asfalto o concreto. Use tiza para marcar una área cuadrada con lados que midan cinco metros. Riegue el segundo grupo de 600 palillos de dientes de diferentes colores en el área pavimentada y pídale a los estudiantes que se paren al borde de ésta. Dígale, "¡Ustedes son pájaros y tienen que comerse todas la orugas que encuentren en 30 segundos!"

Allow students 30 seconds to gather toothpicks. This time, find out if the students picked up any one color of toothpicks less often than any other. After they collect the toothpicks, ask them:

"Was the color green an advantage for a caterpillar on the paved area? [No, the green caterpillars now stand out.] What would happen, then, if caterpillars had to live on pavement instead of grass? For example, if humans built a shopping center in a wild area, how would that change the environment? [Pave over wild areas.] What would happen if the birds could easily see the caterpillars on the parking lot asphalt? [They would eat more of the green caterpillars.] Then, what would happen? [Their numbers would decrease.]"

"The caterpillars might become rare enough to be an *_**endangered animal**_. Fortunately, humans can return a paved area to grass. The change to pavement need not be forever. But, still, is it likely that people would change it back? Why or why not?"

Pregunte a los alumnos:

"¿Fue una ventaja el color verde para la oruga que estaba en el pavimento? [No, las orugas verdes se veían muy bien]. ¿Qué pasaría si las orugas en vez de vivir entre la hierba tuvieran que vivir sobre pavimento? Por ejemplo, si los seres humanos construyeran un centro comercial en un área verde, ¿cómo cambiaria esto al ambiente? [Se pavimentaría el área verde]. ¿Qué pasaría si los pájaros pudieran ver facílmente a las orugas en el pavimento del estacionamiento? [Se comerían más orugas verdes]. ¿Luego que pasaría? [Habría menos orugas]. Es

posible que las orugas fuesen lo suficientemente poco comunes para caer en peligro de extinción. Afortunadamente los seres humanos podemos convertir un lugar pavimentado en una área verde; este cambio no tiene que ser para siempre. Pero, ¿creen que seria probable que la gente convirtiera el pavimento en área verde? ¿Por qué sí o por qué no?"

Debriefing (10 minutes)

During this time, engage students in a discussion about other human activities they can think of that may harm the natural habitats of animals. Tell them that they will study some of these human activities in a later unit.

Closing (10 minutes)

Tell students that they have learned many things today. Not only did they learn that human activity may affect an animal's chance to survive in nature, but they also learned that the five basic needs for survival are the same for both animals and humans. Review these five basic needs, and ask students if they think it is possible for humans to meet these needs without harming other animals?

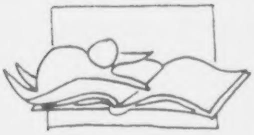
Parent Link

Send home a sample of a "professional," or "business letter" and information about how one should be written (available in most office handbooks), with a list of your own local/national environment resource organizations, or with a copy of the one that appears in the back of this curriculum. Have children discuss with parents what they learned about today. With their parents, have students choose an organization that they'd like to write to to learn more about issues pertaining to the environment and to endangered species. It'll be a good experience to get families to work together in writing an official "business letter." We want our children, and parents as well, to be able to write to organizations both for information that concerns them and their families as well as for help, if need be.

Enlace familiar

Mande a la casa una muestra de una carta "profesional o de negocios" e información acerca de cómo debe escribirse una carta de este tipo (esta información está disponible en la mayoría de los manuales de oficina), con una lista de organizaciones locales/nacionales que trabajan con los recursos del medio ambiente o una copia de la lista que aparece en la parte de atrás de este manual. Diga a los alumnos que conversen con sus padres sobre lo que aprendieron hoy. Los estudiantes, junto a sus padres, pueden escoger una organización que les guste para

escribirles y obtener más información acerca de temas que se refieren al medio ambiente y a las especies que están en peligro de extinción. Sería una buena experiencia lograr que las familias trabajen juntas para escribir una carta oficial de "negocios". Queremos que los niños y los padres estén capacitados para escribirle a organizaciones para pedir información que les concierne o para pedir ayuda cuando la necesiten.



Literature Link

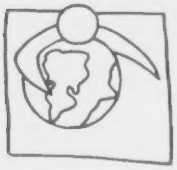
Urban Roosts: Where Birds Nest in the City, by Barbara Bash, focuses on the impact of urbanization on wildlife. It is recommended for Grades 1-6.

The Lorax, by Dr. Seuss, demonstrates the impact humans can have on the environment. In this Dr. Seuss classic, the beautiful forest is being destroyed because humans need the trees to make "Thneeds." Recommended for grades K-8. (Available in Spanish from Lectorum Publishers.)

The Girl Who Loved Caterpillars, adapted by Jean Merrill, also provides a great literature link. Recommended for Grades 2-6.

Lesson 16

Going to Bat for Animals
En defensa de los animales



Overview

This lesson deepens student awareness of animal extinction. It encourages them to contemplate the importance of an animal's habitat and its preservation, and how people are involved in determining the fate of many endangered animals.

Resumen

Esta lección concientiza a los alumnos acerca de la extinción animal. Los anima a contemplar la importancia del hábitat de un animal, su conservación y cómo los humanos están involucrados en decidir el futuro de muchos animales en peligro de extinción.

Key Skills

Analyzing

Experimenting

Making inferences

Writing

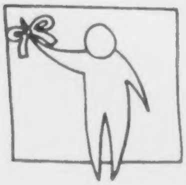
Destrezas claves

Analizar

Experimentar

Hacer inferencias

Redactar



Preplanning

1. Duplicate enough bat counters to have 10 counters for each cooperative learning group. Color each bat counter either red, yellow, blue, or green so that you have some of each color.
2. Place 10 bat counters on each paper plate. Make sure that each plate holds some red, yellow, blue, and green counters.

3. Duplicate and cut out the appropriate number of "Bat Fan" buttons.
4. Read "Background for the Teacher."

Background for the Teacher

Bat folklore goes back many centuries. Aesop, in several fables, depicted bats as unscrupulous liars. The Mayans of Central America drew bats as gods of darkness and the underworld. John Heywood, the English poet, wrote that "these creature that fly like birds, bite like beasts, hide by day, and see in the dark, can surely be neither flesh, nor fowl, nor good red herring."

Bats are the only mammals that can fly. Bat wings are thin membranes of skin that stretch from a bat's body to the elongated bones of its forearm, hand, and fingers. Bat faces look peculiar because of their noses. Bats are not blind, but they use many of their facial structures in echolocation. A bat emits ultrasonic sound through its mouth or nose. These sounds echo from nearby objects and are picked up by its ears. This method of orientation allows bats to avoid striking objects in their path and to locate, identify, and capture tiny moving prey in total darkness.

Most bats eat moths and beetles, although they also consume mosquitoes, flies, grasshoppers, cockroaches, termites, flying ants, and other insects. Insect-eating bats control the size of insect populations (bats consume a third of their body weight in insects each night). Only three of the 900 species of bats feed on blood. These "vampire bats" are capable of spreading rabies whenever they feed, but like other mammals, they either become paralyzed and die when they are infected with rabies, or they survive exposure without spreading the disease. The "vampire bats" inhabit Mexico, Argentina, and Chile, and rarely consume human blood.

Bats are important commercially as pollinators and as seed dispersers. Flower-visiting bats live in tropical and near-tropical regions. These bats travel from blossom to blossom transporting pollen. For many plants, such as the saguaro cactus, balsa trees, and some agaves, bats are the primary agents of pollination.

Bats spend the majority of their lives roosting. They roost in caves and such structures as mines, cellars, and tunnels. Roosts provide bats with protection from predators and unfavorable weather. While under this protection, bats can rest, sleep, hibernate, eat, digest, hunt, groom, communicate, mate, give birth, and raise young.

The population of bats has experienced a major decline during recent decades. Several species of bats already are ***extinct**, and others are near ***extinction**. People are the major threat to the survival of bats. When people use agricultural pesticides to kill insect pests, the pesticides can poison the insect-eating bats. If people arouse bats during hibernation, the bats lose valuable stored fat and can starve to death before their food supply emerges in the spring. When people destroy habitats for crops, livestock, and housing, bats, as well as many other animals, suffer.

Concern about the worldwide decline of bats has led to conservation efforts. Special gates in front of cave entrances allow easy passage for bats but exclude people. Bat houses and towers placed in the forest and in backyards attract insect-eating bats. People are restoring bat roosts that have been disturbed. Many countries offer bats legal protection. In the United States, a number of species are protected under the Endangered Species Act. Through education, people are changing their negative attitude towards bats, and are realizing their ecological, economic, and scientific value.

Información para el/la maestro/a:

Hace muchos siglos que existe el mito sobre los murciélagos. En varias fábulas, Esopo los representaba como mentirosos sin escrúpulos. Los mayas de Centro América los dibujaban como dioses de la obscuridad y del mundo subterraneo. El poeta inglés John Heywood escribió: "Estas criaturas que vuelan como aves, muerden como animales, se esconden de día y ven en la obscuridad seguramente no son ni carne, ni ave, ni pez".

Los murciélagos son los únicos mamíferos que vuelan. Sus alas son membranas delgadas de piel que se estiran desde el cuerpo hasta los huesos largos de su antebrazo, mano y dedos. La cara del murciélago se ve muy rara debido a su hocico. Los murciélagos no son ciegos, pero utilizan muchas de estas estructuras faciales para la localización por medio del eco. El murciélago emite sonidos ultrasónicos por la boca u hocico. Estos sonidos hacen eco con objetos cercanos que detecta el oído del murciélago. Con este sistema de orientación, los murciélagos no chocan con las cosas al volar y en la obscuridad pueden localizar, identificar y capturar presas pequeñisimas.

Casi todos los murciélagos comen polillas y escarabajos, aunque también consumen mosquitos, moscas, saltamontes (chapulines), cucarachas, termitas, hormigas voladoras y otros insectos. Los murciélagos que comen insectos controlan el tamaño de la población de estos; cada noche consumen insectos en una cantidad equivalente a una tercera parte de su peso total. De las 900 especies de murciélagos, solamente tres especies se alimentan de sangre. Estos murciélagos vampiro son capaces de transmitir la rabia al comer, pero ellos mismos, al igual que otros mamiferos, al estar infectados quedan paralizados y mueren o sobreviven el contacto con la rabia sin transmitirla. Los murciélagos vampiro viven en México, Argentina y Chile y rara vez consumen sangre humana.

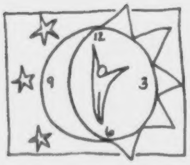
Los murciélagos tienen importancia comercial, porque transportan pólen y dispersan semillas. Los murciélagos que visitan flores viven en regiones

tropicales y semitropicales. Vuelan de flor en flor, transportando pólen. Para muchas plantas, como el saguaro, el árbol de balsa y algunos agaves, los murciélagos son los agentes más importantes para la polinación.

Los murciélagos pasan casi toda la vida posados sobre algo. Se posan en cuevas y en estructuras como minas, sótanos y túneles. Las perchas los protegen de los animales rapaces y del mal tiempo. Protegidos de esta manera, pueden descansar, dormir, invernar, alimentarse, digerir, cazar, aliñarse, comunicarse, aparearse, tener crias y cuidar a su cría.

En las últimas décadas la población de murciélagos ha bajado notablemente. Varias especies de murciélagos ya se han extinguido y otras están a punto de extinguirse. La mayor amenaza para su supervivencia son los humanos. Cuando la gente usa pesticidas agrícolas para matar a la plaga de insectos, los pesticidas pueden envenenar a los murciélagos que comen estos insectos. Si la gente molesta a los murciélagos mientras están invernando, pierden la grasa acumulada y pueden morirse de hambre antes de volver a encontrar alimento en la primavera. Cuando la gente destruye el hábitat animal para el cultivo, la ganadería o la construcción de viviendas, los murciélagos así como muchos otros animales sufren las consecuencias.

La preocupación por la disminución mundial de los murciélagos ha resultado en esfuerzos por conservarlos. Frente a las entradas de las cuevas, rejas especiales permiten el paso a los murciélagos pero no a la gente. Las casas de murciélagos y torres colocadas en jardines y bosques atraen a los murciélagos que comen insectos. La gente está reponiendo perchas que se habían alterado. Muchos países ofrecen protección legal a los murciélagos; en los Estados Unidos varias especies están protegidas bajo el Acta de Especies en Peligro. Gracias a la educación, la gente está cambiando sus actitudes negativas hacia los murciélagos y dándose cuenta de su valor ecológico, económico y científico.



Suggested Time

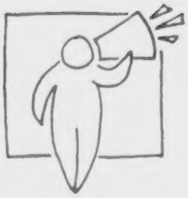
10 minutes—Welcoming
45 minutes—Homework/Learning Options
25 minutes—Extinct is Forever
15 minutes—Guided Discussion
20 minutes—Journal
5 minutes—Closing

2 hours total

Materials

A teacher can conduct this lesson alone, if necessary. A teaching assistant would be helpful in providing guidance to students during the activity. You will need the following materials:

- One paper plate (one for each cooperative learning team).
- Handout 16.1, "Bat Counter and Bat Fan Button."
- A box or bag to hold bat counters.
- Pins to attach "Bat Fan" button (one per student).



Suggested Quote/Cita sugerida

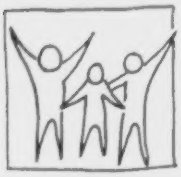
The endangered are not species.
The endangered is "beauty,"
Unfrozen.

—Bernice Zamora, as quoted in *The Fire in Our Souls*

Ms. Zamora is a Chicana poet whose collection of poetry, *Restless Serpents*, is one of the seminal works of Chicana poetry.

Lo que está en peligro de extinción no son las especies. Lo que está en peligro de extinción es la "belleza" natural.

—Bernice Zamora



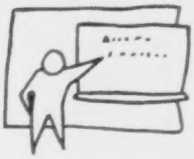
Welcoming (10 minutes)

Greet students and take attendance. Choose a few student volunteers to chart today's attendance and weather.

Ask students what they remember from the last lesson. Review the terms ***endangered** species and ***extinction**, and tell them that today they will learn about an animal that is in danger of becoming extinct. Distribute the "Bat Fan" buttons with a pin, and have the children wear the button as they learn about the animal in today's lesson. Ask students what they know about bats.

Homework/Learning Options (45 minutes)

Students may use this time to complete homework assignments or receive individualized tutoring.



Curriculum

Extinct Is Forever (25 minutes)

Divide students into their cooperative learning groups. Distribute a plate of bat counters to each group.

Tell students:

"Pretend that these [point to the bats on all of the plates] are all the bats that exist in the world. You are scientists studying bats in different countries, and each plate represents a different country's bats. Each color of bat represents a different kind of bat (just as there are different species of whales or bears). If each country has some of each kind (color) of bat, that country has a healthy population of bats. The bats, then, are not ***endangered**. Does your country have a healthy population of bats? [Yes.]"

"Changes are happening in the world that ***endanger** the bat population. Each time a change occurs, there are bats that do not survive. [Remind students of the last activity, and what happens when we develop wilderness areas]."

"If you lose all of one color of bat, then the bats in that country become ***endangered**. When a country loses all the bats of every color, the country's bats are ***extinct***; the bats are gone forever."

Diga a los alumnos:

"Supongamos que estos son todos los murciélagos que existen en el mundo. Ustedes son científicos que están estudiando los murciélagos en diferentes países y los platos representan los murciélagos de cada país. Cada color representa una especie diferente de murciélago (así como hay diferentes especies de osos o ballenas). Si cada país tiene algunos murciélagos de cada especie (color), existe una población saludable de murciélagos. Miren sus platos. ¿Su país tiene una población sana de murciélagos? [Sí.]"

"En el mundo están ocurriendo cambios que ponen en peligro la población de murciélagos. Cada vez que ocurre un cambio hay murciélagos que no sobreviven. Si se pierden todos los murciélagos de cierto color, los murciélagos de ese país están ***en peligro de extinción***. Cuando un país pierde todos los murcíelagos de todos los colores, estos se ***extinguen**; ya nunca más habrán murcíelagos".

Read the following changes one at a time to your students. Explain to them that you will be describing changes that will affect their country and the number of bats that live there. After each change, students will either deposit or withdraw bats to the box or bag you have prepared. Demonstrate to students that each bat counter represents 100 bats of that color. [If 100 bats die, students will return one bat counter.]

Tell students:

"After each change, return to me in this box [or bag] all the bats that do not survive. Before we begin, check to see if you have all four colors of bats in your country."

Diga a los alumnos:

"Después de cada cambio, devuelvan a esta caja [o bolsa] todos los murciélagos que no sobrevivan. Antes de empezar revisen bién para ver si en su país hay murciélagos de todos los colores".

After each change, ask for a show of hands for countries with a healthy population of bats (all four colors are in plate), ***endangered** population of bats (all of one color of a bat is gone), and *extinct populations of bats (all the bats are gone).

1. Change: 100 RED bats die in every country because people think they are dangerous, and they try to get rid of them.
2. Change: 100 GREEN bats die in each country because of a sickness that affects this species.
3. Change: 200 bats in each country die because they ate insects sprayed with chemicals.

4. Change: 100 bats in each country die because they get a disease.
5. Change: 100 bats are born in each country because people preserve some areas where they live.
6. Change: 200 bats die in each country because the fruit many of them eat is sprayed with insecticide.
7. Change: 300 bats in each country die because the caves in which they roost are disturbed.
8. Change: 100 bats are born in each country because the country uses a new insecticide that doesn't hurt the bat.
9. Change: 200 bats in each country are killed because people are afraid of them.

Después de cada cambio, pregúntele que levanten las manos aquellos estudiantes que sepan qué países tienen una población saludable de murciélagos (todos los colores se encuentran en un plato), cuales tienen una población de murciélagos ***en peligro de extinción*** (no se encuentra ninguno de los murciélagos de un color particular), y poblaciones de murciélagos que han desaparecido, o sea que se han ***extinguido***.

1. Cambio: En cada país mueren 100 murciélagos ROJOS porque la gente piensa que son peligrosos y tratan de matarlos.
2. Cambio: En cada país mueren 100 murciélagos VERDES de una enfermedad que afecta a su especie.
3. Cambio: En cada país mueren 200 murciélagos porque comieron insectos rociados con substancias químicas.
4. Cambio: En cada país mueren 100 murciélagos porque contraen una enfermedad.
5. Cambio: En cada país nacen 200 murciélagos porque la gente trata de conservar los lugares donde viven.
6. Cambio: En cada país mueren 200 murciélagos porque comen fruta rociada con insecticida.
7. Cambio: En cada país mueren 300 murciélagos porque las cuevas donde viven han sido perturbadas.
8. Cambio: En cada país nacen 100 murciélagos porque se usa un nuevo insecticida que no les hace daño.
9. Cambio: En cada país se matan 200 murciélagos porque la gente les tiene miedo.

Optional Activity:

This activity can be simplified or made more challenging by varying the value of each bat counter. If counting by 100's is too difficult, reduce the value of each counter to 10 or to 1. To make the activity more challenging, include various denominations of "bat counters." For example, have bats that are worth 25, 50, and 100. Make sure that each group has a total of 1,000 before beginning the activity. Another suggestion is to provide students from each team with an opportunity to swap bats with the other teams. Can each team retain a healthy population of bats by working with other teams?

When the bats become extinct, tell students:

"The bats are gone forever. There are no more bats to be seen anywhere in the world. ***Extinction** is a change that lasts forever."

Cuando los murciélagos se hayan extinguido, digale a los alumnos:

"Los murciélagos se han ido para siempre. Ya no hay murciélagos; ya no se ven en ninguna parte del mundo. La ***extinción** es un cambio que perdura por siempre".

Guided Discussion (15 minutes)

Put the bats away and do not bring them out again. Discuss what happened to the bats with students.

Ask them:

"What might you have done to save the bats from extinction? Bats really are in danger today. Several species of bats already are extinct, and others are near extinction. One reason is that many people don't like bats."

Diga a los alumnos:

"¿Qué podrían haber hecho ustedes para salvar a los murciélagos de la extinción? En verdad, hoy en día los murciélagos están en peligro. Varias especies de murciélagos ya están extintas y otras están a punto de extinguirse. Una razón es que a mucha gente no les gustan los murciélagos".

Use "Background for the Teacher" to provide your students with more information. If possible, read them "The Bat Poet," by Randall Jarrell, or one of the books listed in the Literature Links.

Tell students to wear "BAT FAN" buttons at school, and at home, so that people will ask them questions. They can then explain to anyone who asks about the buttons that bats, like many animals, are endangered and need people to help them survive.

Tell students:

"There are many more animals that are ***endangered**, like the bat, and some of them could avoid ***extinction** with the help of people. You can do many things to help. One thing is to tell people about ***endangered** animals."

Diga a los alumnos:

Hay muchos animales más que están ***en peligro**, como el murciélago y necesitan que la gente les ayude a evitar su ***extinción**. Ustedes pueden ayudar de muchas maneras. Una manera de ayudar es hablar con la gente acerca de los animales que están en ***peligro de extinción**.

Journal (20 minutes)

Have students record in their journals what they've learned about extinction, and sketch an illustration to represent some aspect of what they have learned. Have students respond to the question, "What does extinction mean to me?"

Closing (10 minutes)

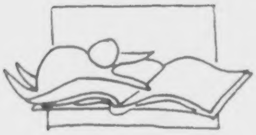
In closing, review the concepts that were learned in this unit. In particular, emphasize the similarities between animals and humans. (We all need food, water, shelter, space, and air. We all need to find ways to communicate.) Tell students that the next unit focuses on how humans fulfill some of their needs. Tell students that, in a later unit, we will continue to look at how humans can have a beneficial influence on wildlife.

Parent Link

Reinventing Beauty. The fact that people fear bats is due both to negative myths and to limiting ideas about what is beautiful. With their families, have students weave a magic tale where bats' special "hearing" skills may come in handy, where their own "special" beauty is recognized, or where some new, hidden magical powers are attributed to them that help others save the day. (You may want to introduce this, to either parents or students, by having a brief discussion about bat tales from the different countries represented in your classroom. A follow-up classroom activity could be an end-of-the-unit "New Bat Tales" anthology.)

Enlace familiar

Reinventando la belleza. Los mitos negativos que se les atribuyen a los murciélagos y las ideas limitadas de lo que es la belleza, hace que la gente les tenga miedo. Pida a los niños que junto con sus padres inventen un cuento mágico, donde las habilidades especiales de escuchar de los murciélagos pueden ser útiles, donde su belleza especial sea reconocida o donde se les atribuyan nuevos poderes mágicos ocultos que les ayuden a otros a salvar el día. (Esto puede introducirse a los padres o alumnos por medio de una conversación breve sobre los cuentos de murciélagos de diferentes paises representados en la clase. Una actividad complementaria para la clase podría ser el hacer una antología de "cuentos nuevos de murciélagos" para el final de la unidad).



Literature Links

Will We Miss Them? by Alexandria Wright will help students deepen their understanding of extinction through the magic of storytelling. Recommended for grades 2-5. (Available in Spanish from Hispanic Books Distributors.)

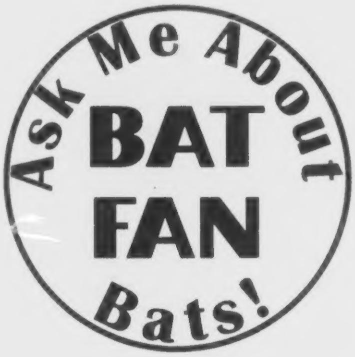
Roger Few's *Macmillan Children's Guide to Endangered Animals* will give your students a picture-book tour of endangered animals, by country, and facts from an animal's scientific name to what region of a country it can be found in. Recommended for grades 4-6.

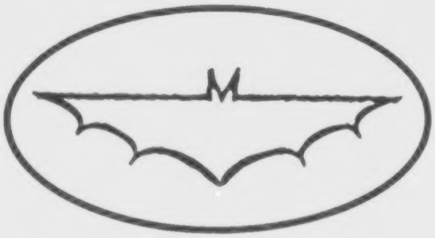
Tuiiiiiii: El Murciélago (Spanish). A beautiful story of the friendship between a young boy, Coco Cabogh, who lived in the southern region of Mexico thousands of years ago, and his friend Tuiiiiiii, a bat. Coco's tribe has no sympathy for these creatures, and the book tells the story of how everyone comes to value and appreciate them. Recommended for grades 3-5. [Available through Hispanic Books Distributors.]

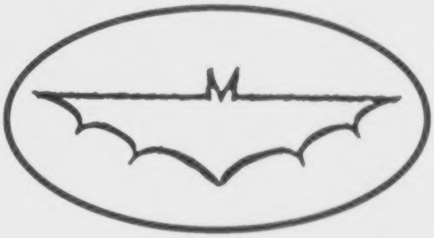
In Janelle Cannon's *Stellaluna*, a baby fruit bat, who is accidentally knocked into a bird's nest, is adopted by these birds. When she's finally reunited with her mother and the other bats, she learns that the differences betwen bats and birds are much less significant than her newfound friendship. Recommended for grades Pre-K to 3.

Handout 16.1

Bat Counter and Bat Fan Button Pattern

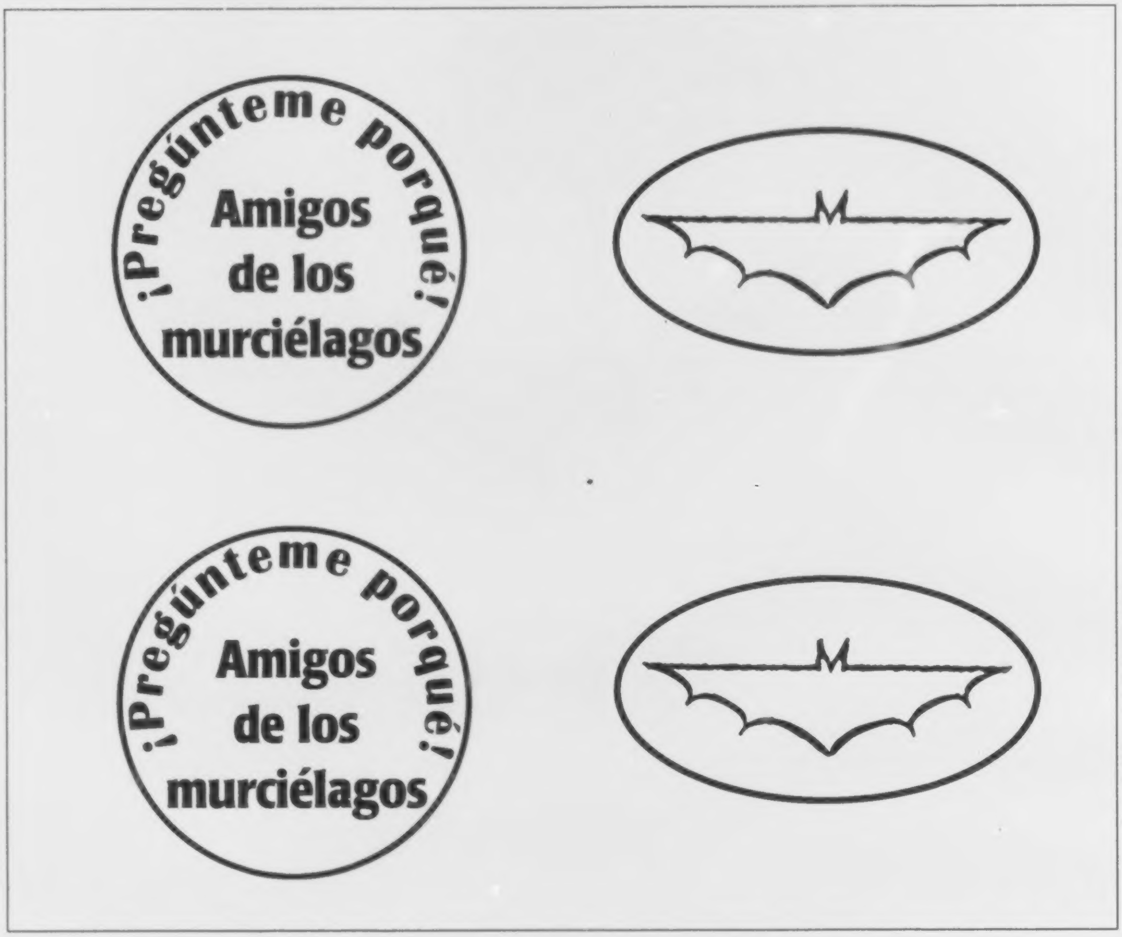






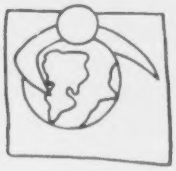
Hoja de trabajo 16.1

Dibujos para fichas y distintivos de murciélagos



Lesson 17

Who will survive?
¿Quién sobrevivirá?



Overview

In this lesson, students review many concepts learned throughout the unit. Working in their cooperative learning groups, they use the skills they have acquired in a game called "Who will survive?"

Resumen

En esta lección los alumnos repasan varios conceptos que han aprendido a través de esta unidad. Trabajando en sus equipos de aprendizaje cooperativo, utilizan las destrezas que han adquirido en un juego llamado ¿Quién sobrevivirá?

Key Skills

Writing

Creating

Problem-Solving

Cooperating

Destrezas claves

Redactar

Crear

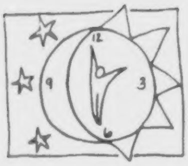
Resolver problemas

Cooperar

Preplanning

1. Review your procedures and rules for work stations with the teaching assistants. Assign teaching assistants to work stations, and make sure each one knows his/her responsibilities.
2. Depending on what resources you will use for Work Station I, secure and set up television and VCR.
3. Prepare Work Station II by placing and taping the green construction paper either on the floor or on a table.

4. For Work Station III, prepare some migajón at home first and mold your own miniature sculpture(s) of an endangered animal. You will then be able to determine just about how much bread your students will need for what size of sculpture, and use your miniatures as models to get students motivated and thinking about possibilities for this project.



Suggested Time

10 minutes—Welcoming
45 minutes—Homework/Learning Options
20 minutes—Work Station I: Characterization
20 minutes—Work Station II: Who will survive?
20 minutes—Work Station III: Nuestro mundo creativo
5 minutes—Closing

2 hours total

Materials

A teacher and teaching assistants are needed to implement this lesson fully, as well as the materials listed below:

At Work Station I:

- Paper, pencils, or markers.
- Video tape(s) of programs from PBS or National Geographic that show endangered animals and tell about them, or
- A list (use copies of Handout 17.2) and pictures of endangered species (the guide to endangered animals cited in Lesson 16's Literature Link is a excellent resource for this project if you must use pictures).
- Copies of Handout 17.1, "Character Descriptors," and Handout 17.2, "Working List of Endangered Animals."

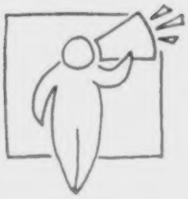
At Work Station II:

- Green construction paper, or a grassy area.
- 400 colored toothpicks; 100 each of red, yellow, green, and blue.
- Paper clips (enough for each person at this station).
- Four pieces of large chart paper and a marker.
- A watch with a second hand.

At Work Station III:

- Handout 17.2 copied onto graph paper or board.
- Enough white bread for the entire class; at least, two to three slices per student.

- Small bottles of white glue; one per two students working at station.
- Tablespoons to measure glue.
- Acrylic paints to finish the miniatures; two to three sets per group should be enough without causing chaos.
- Food coloring, if you want the *migajón* to be tinted prior to modeling.



Suggested Quote/Cita sugerida

The endangered are not species.
The endangered is "beauty,"
Unfrozen.

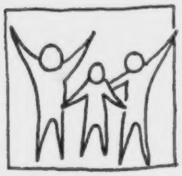
—Bernice Zamora, as quoted in *The Fire in Our Souls*

Ms. Zamora is a Chicana poet whose collection, *Restless Serpents*, is one of the seminal works of Chicana poetry.

Lo que está en peligro de extinción no son las especies. Lo que está en peligro de extinción es la "belleza" natural.

—Bernice Zamora

SESSION PLAN

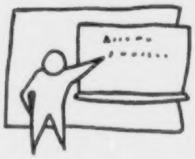


Welcoming (10 minutes)

Welcome students, take attendance, and select a few students to chart the attendance and weather. Tell students that today they will complete Unit 2.

Homework (45 minutes)

Students should use this time to complete any homework assignments, engage in free reading, or receive individualized tutoring.



Curriculum

Work Stations (1 hour; 20 minutes at each)

Work Station I: Characterization

At this station students will develop a story line around an endangered animal character, and write the opening paragraph to it.

Characterization is an important writing skill. It teaches us to be more descriptive in all of our writing; more particularly, to be descriptive with a purpose, to make the most use of sensory details in our work, and to have the right balance of all of these.

Characters are usually human. However, they can also be animals or objects. In a story, we get to "observe" a character's actions, "hear" her/his thoughts, and "watch" how others react to her/him. Through seeing and hearing these things, we get to know the character's personality. The character must always be believable. We make him/her so by including details that will help the reader get to know her/him well.

The project at this station is an ideal follow-up activity to a zoo visit where students are able to observe animal behavior first-hand. However, if this is not possible, have students watch a videotape (use pictures as a last resort) of endangered species like those produced by PBS or National Geographic. (These can either be purchased for classroom use, rented from one of the larger video rental stores, or borrowed from the public library.) Secure two or three programs so that each group is able to watch a different tape, or get one tape with different endangered animal segments. Consider that you can tape your own at home from television specials.

Instruct students to observe the animal closely as they watch the program. While they do so, have them jot down details of the animal's physical appearance, manner of movement, and typical "actions." Instruct students to try to stretch their minds when jotting down details of the animal's appearance. For example, besides distinguishing colors and size, mention what kind of a beak (using what they learned in Academia and listening to the information offered in the program) a bird in question has. After five minutes of observation, turn off the television and ask students to sit comfortably. Next, have them close their eyes and allow their minds to wander—placing the endangered animal in a situation or a different setting for a story. Let them visualize this idea for a few minutes.

When the time is up, have students write the opening paragraph to a story with the endangered animal as the focus. Tell students to let the descriptions of their endangered animal create interest in the reader by "suggesting" the story to be told, as is done in Karin K. Hess's example below after an observation of her dog at home:

> I watched Shadow, our black and white Springer, sprawled by the wood stove. On the floor, beads of dirty water encircled one paw where the frozen chunks had clung to his hair and swollen pads. His sides heaved rhythmically, the skin stretching over his ribs with each rising motion. He was finally asleep; finally home.

Karin's list of "Character Descriptors" in Handout 17.1 may be useful in motivating students in this project. For the younger grades, some of these words could be added to word banks. Be certain, however, that the use of these words does not take the place of details. For example, what could be an "action" that would convey the meaning of the word "dangerous?" If a student has trouble jotting down an animal's movement or typical actions (or if they are too young to do so) the character descriptors can help trigger details that would be useful in writing the paragraph. A minute or two of group charades of an animal's behavior when students get stuck might be able to help them verbalize actions. (You might want to hold on to this list, develop it, come up with actions that correspond to the meaning of the words, add them to the list, and post it in your classroom. This might prove to be an excellent resource for language arts activities, especially those that involve creating stories, or reading and thinking about them.)

The paragraph can be the project in itself, or you can have students expand their individual paragraphs into a story at a later date. Another possibility would be to have students break into their cooperative learning groups at a future date, and have them take turns collaborating on the completion of the stories.

If you are not able to conduct this activity using videotapes, you may use pictures of endangered animals instead, like those in the Literature Link cited

in Lesson 16. Although students will not be able to observe animal behavior themselves, this book provides many details and useful facts about animal behavior that they will be able to use.

A supplementary list of endangered animals is included in Handout 17.2. This list can be utilized for extension activities (like writing acrostics using the animals' names) or simply to inform students. Other animals can be added to this list, and the list transfered to posterboard to be hung in the classroom. Make sure paragraphs/stories are posted in the classroom so teams can view the work of other teams, and that you provide opportunities for reading aloud.

Centro de trabajo 1: Caracterización

En este centro de trabajo los estudiantes van a desarrollar un cuento sobre el carácter de los animales que están en peligro de extinción y escribirán un párrafo como introducción.

La caracterización es una habilidad muy importante. Nos enseña a ser más descriptivos cuando escribimos, particularmente, cómo debemos ser descriptivos con un sentido de propósito, sacándole el provecho más posible a nuestros detalles sensoriales en nuestro trabajo escrito, y adquiriendo el balance ideal de todos estos. Los personajes son generalmente humanos pero también pueden ser animales u objetos. En un cuento nosotros podemos "observar" la acción de los personajes, "escuchar" sus pensamientos, "ver" cómo otros reaccionan con él o ella. Viendo y escuchando esto nosotros podemos conocer el carácter del personaje. El papel que representa el personaje debe ser siempre creíble o real. Nosotros hacemos a los personajes de tál manera que incluyendo detalles acerca de ellos le ayudan a los lectores a conocerlos muy bién.

El proyecto que sigue a este centro de trabajo es una actividad ideal: una visita al zoológico donde los estudiantes observarán el comportamiento de los animales. Si esto no es posible, muestre a los alumnos un video (use fotos como último recurso) de especies que están en peligro de extinción como los que presenta el canal de televisión PBS o National Geographic. (Estos videos se pueden comprar para el uso de la clase o alquilarse de una tienda de videos o tomarse prestados de una biblioteca pública). Asegúrese de tener dos o tres programas para que así cada grupo tenga la oportunidad de ver un programa diferente, o compre un video con diferentes segmentos de animales que están en peligro de extinción. También debe tomar en consideración que se pueden grabar en la casa especiales de televisión.

Diga a los alumnos que cuando vean el programa observen al animal detalladamente. A medida que van observando ellos deben anotar detalles de la apariencia física, forma de moverse y las acciones "típicas" del animal. Diga a los alumnos que usen su imaginación cuando esten anotando detalles de la apariencia del animal. Por ejemplo, aparte de distinguir el color y tamaño, pueden mencionar que clase de pico tiene el pájaro que está en cuestión (pueden usar la información que aprendieron en el programa de la Academia). Después de cinco minutos de observación, apague la televisión y pida a los alumnos que se sienten cómodamente. Luego digale que cierren sus ojos y que dejen que sus mentes divaguen — que pongan al animal en peligro de extinción en una situación o un escenario diferente en el cuento. Deje que visualizen esta idea por unos minutos.

Cuando se termine el tiempo, diga a los estudiantes que escriban un párrafo de introducción del cuento enfocado en el animal en peligro de extinción. Diga a los estudiantes que hagan una descripción creativa de su animal en peligro de extinción que cree interés en los lectores "sugeriendo" el cuento que se va a contar como se hizo en el ejemplo de Karen K. Hess después de que observó el perro en su casa que se menciona a continuación:

> Yo observé a Shadow, un perro Springer blanco y negro estirarse cerca de un fogón para quemar madera. En el piso rodeaban su pata unas gotas de agua sucia donde pedazos congelados colgaban de su pelo cerca de su pata inflamada. Su abdomen se levantaba rítmicamente, su piel se estiraba sobre sus costillas con cada respiración. El estaba dormido finalmente; finalmente en casa.

La lista de "descripción de caracteres" de Karin de la Hoja de trabajo 17.1 puede ser muy útil para motivar a los estudiantes en este proyecto. Para los estudiantes de grados menores, algunas de estas palabras pueden ser añadidas a sus bancos de palabras. Asegúrese de que el uso de esto no reemplaze los detalles. Por ejemplo, que podría representar una "acción" que demuestre el significado de la palabra "peligroso". Si el estudiante tiene problemas para anotar el movimiento del animal o las acciones típicas (o son muy pequeños para hacerlo) la descripción de los caracteres puede ayudarles a desencadenar detalles que pueden ser útiles para escribir el párrafo. Déle unos minutos para que los estudiantes, en grupo, hagan acertijos sobre el comportamiento animal el cúal les ayudará a verbalizar las acciones cuando se estanquen. (Sería buena idea que usted guarde esta lista, la desarrolle, que busque acciones que correspondan al significado de la palabra, que añada a la lista y la coloque en su salón. Esto puede ser un recurso excelente para actividades de lenguaje, especialmente para los que están involucrados en la creación del cuento, su lectura y contemplación).

El párrafo puede ser un proyecto en si o, más tarde, puede pedirle a los estudiantes que los desarrollen hasta el punto de lograr un cuento. Otra posibilidad sería dividir a los estudiantes en grupos cooperativos de aprendizaje más adelante y que ellos tomen turnos colaborando para completar el cuento.

Si no va a conducir esta actividad usando videos, puede usar fotografías de animales en peligro de extinción como las del libro que se menciona en el Enlace Literario de la Lección 16. Aunque los estudiantes no podrán observar el comportamiento del animal, este libro provee muchos detalles e información útil acerca del comportamiento animal que ellos pueden usar.

Se incluye una lista suplementaria de animales en peligro de extinción en la Hoja de trabajo 17.2. Esta se puede utilizar para las actividades adicionales (como escribir acrósticos usando los nombres de los animales) o simplemente para informar a los estudiantes. También se puede añadir a esta lista otros animales y este se puede colgar en un cartel en la clase. Asegúrese de colocar los escritos en el salón para que cada grupo pueda ver el trabajo de otros grupos y se pueden leer en voz alta.

Work Station II: Who Will Survive?

The teacher or teaching assistant needs to staff this station. At this Work Station each student will represent a particular type of caterpillar: red, blue, green, or yellow. If there are more than four students in a cooperative learning group, students should team up. After giving the following instructions, place fifteen to twenty toothpicks of each color on the green paper. (Do not exceed this amount or you may run out of toothpicks!) Make sure that you place equal numbers of each color on this area. Before beginning, make sure that students have decided which color of caterpillar they will represent, and that you have distributed a paper cup to each team member.

Provide students with the following instructions:

"Each of you represents a different kind of caterpillar, based on your color. Some of you are green caterpillars, others are red, yellow, or blue. All of you live in a grassy, green area, which this green paper represents. I will place a number of different types of caterpillars on the grassy area, and when I give the signal, you will try to capture as many of the caterpillars as possible in 30 seconds, and place them in your cup. You cannot capture more than one caterpillar at a time, and before capturing another, you must make sure that you have deposited the captured caterpillar in your cup. You can capture any color of caterpillar that you see. Return all the caterpillars you capture (i.e. that don't survive) to me. Now, let's take a look at those caterpillars that are still in the grassy area. These caterpillars were able to survive for some reason or another. [Most of the surviving caterpillars should be green.] Those caterpillars that survived can ***reproduce** and have more caterpillars."

Have students collect the color toothpicks that remain, and have them report to you the number which survived. For every remaining caterpillar, you will add one to their pile. For example, if eight green toothpicks remain, give the student representing green caterpillars an additional eight green toothpicks. If two yellow toothpicks remain, the student representing yellow caterpillars will be able to reproduce and end up with a total of four yellow toothpicks. In other words, every surviving caterpillar produces an additional caterpillar of the same color. Explain this in full to students.

After students understand that surviving caterpillars can reproduce, toss the surviving toothpicks and the new toothpicks (those that have been added to each child's pile) onto the green paper and repeat the activity. Tell children that, again, they only have 30 seconds to capture as many toothpicks as possible. Children can only pick up one toothpick at a time! After the 30 seconds are up, students will collect their surviving toothpicks and "reproduce again." Depending on how many times the activity can be repeated, some of the caterpillars will become ***extinct**.

At the end of the activity, explain the following:

"Which color of caterpillar was able to reproduce the most? This color caterpillar, because of its color, was better ***adapted** to live on the green grass. The fact that these caterpillars survived, and had ***offspring**, while other color caterpillars were unable to, demonstrates ***natural selection**. These caterpillars, because of their color, were naturally selected to survive and reproduce."

Allow a few minutes at the end of this work station for the recorder of this group to write down, on the available chart paper, the total number of each color of caterpillar that survived in the final round. These charts will be compared with other team charts during the closing session.

Centro de trabajo 2: ¿Quién sobrevivirá?

El maestro o asistente debe ser quién dirija este centro de trabajo. En este centro de trabajo cada estudiante va a representar un tipo particular de oruga: roja, azul, verde o amarilla. Si hay más de cuatro estudiantes en un grupo cooperativo de aprendizaje, los estudiantes deben agruparse para hacer otro grupo. Después de dar las siguientes instrucciones, ponga 15 o 20 mondadientes o palillos de dientes de cada color sobre un papel verde. (No ponga más de esta cantidad de palillos de dientes porque se le pueden terminar pronto). Asegúrese de colocar la misma cantidad de palillos de dientes de cada color. Antes de empezar asegúrese de que los estudiantes decidan qué color de oruga quieren representar y que cada miembro del grupo tenga un vaso de papel.

Provea a los alumnos las siguientes instrucciones:

"Cada uno de ustedes representa un tipo diferente de oruga, según el color de su palillo de dientes que hayan escogido. Algunos de ustedes son orugas verdes,

otros son orugas rojas, amarillas, o azules. Todos viven en un lugar lleno de hierba, que es el papel verde. Voy a poner en este lugar diferentes tipos de orugas. Cuando yo dé la señal, en 30 segundos van a tratar de capturar todas las orugas que puedan y ponerlas en su vaso. Sólo pueden capturar una oruga a la vez y antes de capturar otra tienen que poner a la primera oruga en el vaso. Pueden capturar cualquier color de oruga que vean. Me devolverán a mí todas las orugas que capturaron y no sobrevivieron. Ahora, vamos a ver a las orugas que siguen en la hierba. Estas orugas pudieron sobrevivir por alguna razón [la mayoría de las que sobrevivieron deben ser verdes]. Estas orugas que sobrevivieron podrán ***reproducirse*** y producir más orugas".

Diga a los estudiantes que colecten los palillos de dientes que sobraron y que reporten el número de orugas que sobrevivieron. Por cada oruga que sobrevivió aumentó uno en su montón. Por ejemplo, si sobraron ocho palillos de dientes verdes, déle al estudiante que representa a las orugas verdes ocho palilos de dientes adicionales. Si es que sobran dos palillos de dientes amarillos el estudiante que representa a este color de orugas será capaz de reproducir un total de cuatro palillos de dientes amarillos. En otras palabras, cada oruga que sobreviva reproduce una adicional del mismo color. Explique esto a los estudiantes detalladamente.

Después que los estudiantes entiendan que las orugas que sobreviven pueden reproducir, bote los palillos de dientes que sobrevivieron y los nuevos palillos de dientes (los que se añadieron al montón del estudiante) dentro del papel verde y repita la actividad. Diga a los estudiantes que tienen 30 segundos para capturar la mayor cantidad de palillos de dientes posibles. Los niños pueden levantar un solo palillo de dientes a la vez. Después de que pasen 30 segundos los estudiantes colectarán sus palillos de dientes que sobrevivieron y se reproducirán otra vez. Dependiendo de cuantas veces se puede repetir la actividad algunas de las orugas se ***extinguirán***.

Al final de la actividad explique a los alumnos lo siguiente:

"¿De qué color son las orugas que pudieron reproducirse más? Las orugas de este color, debido a su color estaban mejor ***adaptadas*** para vivir en la hierba verde. El hecho de que estas orugas sobrevivieran y tuvieran crías, mientras que las orugas de otro color no pudieron, demuestra la ***selección natural***. Estas orugas, por su color, fueron seleccionadas por la naturaleza para sobrevivir y reproducirse".

Permita unos minutos para que el registrador de grupo anote en el papel el número total de cada color de oruga que sobrevivió en la vuelta final. Esta gráfica se comparará con las de otros grupos durante la sesión de cierre.

Work Station III: *Nuestro mundo creativo – Migajón* Miniatures

Using the list provided as Handout 17.2, students will make representations of an endangered animal using *migajón*, a modeling material thought to have been invented in Ecuador. Today, children throughout Central and South America make miniature toys and decorations using this material.

A teaching assistant should be able to manage this station alone. Keep in mind that migajón needs to dry before it can be painted. (The painting might need to take place during another time as a follow-up activity.)

Have students select an endangered animal from the list provided as Handout 17.2. To guide them, they can look up the animal in the endangered species book cited in Lesson 16's Literature Link. Another choice, for older students, would be to have them model the endangered animal they observed and wrote about in Work Station I, and try to capture one of the movements or "typical" actions they observed in this animal.

Basic *migajón* recipe: Have students trim the crust from a piece of white bread. Next, have them tear the bread into pieces. Using their hands, have them mix one tablespoon of white glue into the bread. The mixture will be very sticky at first, but will slowly become more like clay. Students can now begin to mold their endangered animal.

The *migajón* sculptures can now be put aside to air dry, or they can be baked in an oven at 200°F for an hour (or long enough for them to become hard). You may want to turn the sculptures periodically to speed up the drying.

The sculptures are now ready for painting. If you want to skip this part, you can add food coloring to the *migajón* mixture before it is modeled.

Centro de trabajo 3: "Nuestro mundo creativo" – Miniaturas de migajón

Usando la lista que se provee en la Hoja de trabajo 17.2, los estudiantes harán representaciones de los animales que están en peligro de extinción usando *migajón*, un material que se usa para modelar que se cree haber sido inventado en Ecuador. En estos dias los niños en todo Centro y Sud América hacen juguetes de miniatura y decoraciones usando este material.

Un asistente de maestro será suficiente para trabajar en este centro de trabajo. Tenga en cuenta que el *migajón* debe estar seco antes de que lo pueda pintar.

Pida a los estudiantes que elijan un animal que está en peligro de extinción de la lista que se provee en la Hoja de trabajo 17.2. Para guiarse los estudiantes pueden buscar el animal en el libro de especies en peligro de extinción que se menciona en el Enlace Literario de la Lección 16. Otra opción para los estudiantes mayores sería pedirles que modelen el animal que está en peligro de extinción que

observaron y escribieron en el centro de trabajo 1, y traten de capturar uno de los movimientos o acciones "típicas" que ellos observaron en este animal.

Receta básica de migajón: Pida a los alumnos que corten los bordes de un pedazo de pan blanco. Luego, pida que lo corten en pedazos. Usando sus manos, pida que mezclen los pedazos de pan con una cucharada de pegamento blanco. Al comienzo la mezcla será muy pegajosa, pero lentamente se convertirá como en una especie de arcilla o barro. Ahora los estudiantes pueden empezar a moldear su animal en peligro de extinción.

Las esculturas de migajón ahora se pueden dejar a un lado para que se sequen, o se pueden poner al horno a una temperatura de 200°F por una hora (o el tiempo necesario para que se endurescan). Sería conveniente darles vuelta a las esculturas periódicamente para acelerar el secado.

Las esculturas ahora están listas para pintarse. Si quiere omitir esta parte, pueden añadir colorante para comidas a la mezcla de migajón antes de que se haga el moldeado.

Closing (5 minutes)

Allow each cooperative learning group's reporter to share the results of the "Who Will Survive?" activity. The charts for the different groups should demonstrate similar findings. Allow the class to discuss these similarities.

Parent Link

Duplicate Handout 17.3 to send home with students. Have students share with parents what they have learned recently about endangered animals. Have parents and children work together to write a letter to one of the organizations listed in the handout to request information concerning endangered wildlife. Once the information is collected, students can create an informative bulletin board, resource files, or cooperative group class reports.

Enlace Familiar

Duplique la Hoja de trabajo 17.3 para mandar a la casa con los estudiantes. Pida a los alumnos que compartan con sus padres lo que aprendieron recientemente acerca de los animales que estan en peligro de extinción. Pida a los padres y alumnos que trabajen juntos para escribir una carta a una de las organizaciones que se menciona en la hoja de trabajo para pedir información acerca de los animales salvajes que estan en peligro de extinción.

Una vez que reunan esta información, los estudiantes pueden crear un tablero informativo en la clase, archivos de recursos, o reportes de grupos cooperativos de la clase.

Handout 17.1

Character Descriptors*

accepting
adaptable
aggressive
ambitious
bold
brave
calm
carefree
caring
certain
clever
confident
courageous
cranky
creative
dependable
dependent
determined
fearful
friendly
full of life
gentle
hostile
imaginative
irritable
jealous
kind
lazy
lively
loving
maternal
moody
observant
original
passive
patient
playful
pleasant
powerful
practical
precise
protective
proud
quiet
reassuring
rebellious
rigid
self-aware
serious
shy
silly
skillful
sly
sociable
strong
strong-willed
stubborn
tender
tough
trusting
unaware
unconcerned
unpredictable
vulnerable

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*Adapted from Karin K. Hess's list in *Enhancing Writing Through Imagery.*

Hoja de trabajo 17.1

Adjetivos para uso en descripciones de personajes

aceptable
adaptable
agresivo
ambicioso
audaz
valiente
calmado
despreocupado
preocupado
determinado
listo
confidente
valiente
irritable
creativo
confiable
dependiente
determinado
temeroso

amigable
lleno de vida
suave/delicado
hostil
imaginativo
irritable
celoso
bueno
flojo
vivaz
cariñoso
maternal
malhumorado
observador
original
pasivo
paciente
juguetón
agradable

poderoso
práctico
preciso
protector
orgulloso
callado
de confianza
rebelde
rígido
consciente de su propia personalidad
serio
tímido
tonto
hábil
astuto
sociable
fuerte
fuerte de voluntad
obstinado

tierno
duro
confiado
inadvertidamente
indiferente
impredecible
vulnerable

*Adaptado de la lista de Enhancing Writing Through Imagery de Karin K. Hess's

Handout 17.2

Working List of Endangered Animals

African Forest Elephant

American Crocodile

Asian Elephant

Bactrian Camel

Bald Eagle

Barred Owl

Bengal Tiger

Black Leopard

Black Rhinoceros

Cheetah

Chimpanzee

Desert Tortoise

Galapagos Turtle

Giant Panda

Jaguar

Koala

Mouse Armadillo

Orangutan

Polar Bear

Puma

Red Kangaroo

Sea Otter

Siberian Tiger

Snow Leopard

Spider Monkey

Spotted Owl

White Rhinoceros

Yak

Hoja de trabajo 17.2

Lista inicial de animales en peligro de extinción

Elefante africano
Cocodrilo americano
Elefante asíatico
Camello bactriano
Aguila calva
Lechuza listada
Tigre de Bengal
Leopardo negro
Rinoceronte negro
Leopardo cazador
Chimpancé
Tortuga del desierto
Tortuga de Galápagos
Panda gigante
Jaguar
Koala
Armadillo ratón
Orangután
Oso polar
Puma
Canguro rojo
Nutria de mar
Tigre de Siberia
Leopardo de las nieves
Mono araña
Lechuza pinta
Rinoceronte blanco
Oso gris

Handout 17.3

*Resource Organizations: Endangered Wildlife Information Listado de organizaciones: Recursos sobre animales en peligro de extinción

Center for Marine Conservation
1725 DeSales St., NW, Suite 600
Washington, DC 20036
(202) 429-5609

Defenders of Wildlife
1101 14th St., NW, Suite 1400
Washington, DC 20036
(202) 682-9400

Greenpeace
Public Information
1436 U St., NW
Washington, DC 20009
(202) 462-1177

National Wildlife Federation
1400 16th St., NW, Suite 500
Washington, DC 20036
(202) 797-6800

The Nature Conservancy
1815 N. Lynne St.
Arlington, VA 22209
(703) 841-5300

World Wildlife Fund
1250 24th St., NW, Suite 500
Washington, DC 20037
(202) 293-4800

U.S. Fish and Wildlife Service
Department of the Interior
18th and C Sts., NW
Washington, DC 20240
(202) 208-3100

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* Additional information may be obtained from each state Department of Fish and Game or Wildlife

UNIT 3

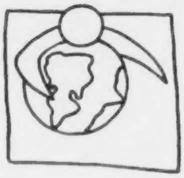
Human Habitats
El hábitat humano

Introduction

In the previous unit, students learned that shelter is a basic need of all humans and animals. This unit focuses on how humans construct their shelters. Humans make use of resources such as heat generated from the sun, air, fresh water, and soil that comes from the earth, to live and protect themselves. The first four lessons introduce students to design technology, and some of the basic principles used in making buildings and structures stand and resist the force of earthquakes and windstorms. Students build models, conduct experiments, observe and record data, and plot their findings on graphs and in journals. In the six lessons that follow, students explore the sun as a natural resource used to create heat and energy. They explore the properties of solar energy as they build model homes and water heaters that utilize the sun's heat. To implement these lessons, you will need the teacher's guide to *Hot Water and Warm Homes from Sunlight*, a curriculum developed by Great Explorations in Math and Science (GEMS), Lawrence Hall of Science, University of California at Berkeley (See Appendices for ordering information). Since the GEMS materials are currently only available in English, some suggested "scripts" are provided in Spanish.

Introducción

En la última unidad los alumnos aprendieron que el albergue es una necesidad básica de todos los seres humanos y los animales. Esta unidad se enfoca en cómo los humanos construyen sus viviendas. Los humanos se valen de recursos como el calor generado por el sol, el aire, el agua fresca y la tierra para vivir y protegerse. Las primeras cuatro lecciones presentan a los alumnos la tecnología del diseño y algunos principios básicos de la construcción para que los edificios puedan resisistir la fuerza de temblores y ventarrones. Construyen modelos, hacen experimentos y registran sus datos en diarios y gráficas. En las siguientes seis lecciones, los alumnos exploran las propiedades de la energía solar al construir casas modelo y calentadores de agua que utilizan el calor del sol. Para implementar estas lecciones, se necesita el manual para maestros del libro *Hot Water and Warm Homes from Sunlight*, un programa desarrollado por Great Explorations in Math and Science (GEMS), Lawrence Hall of Science, University of California at Berkeley. Como estos materiales sólo se consiguen en inglés, se proveen aquí algunas instrucciones en español.



Overview

Lesson 18: Design Technology: Introduction

Based on the story *The Three Little Pigs*, students explore what other options the pigs had in building their houses. They also rewrite the story of *The Three Little Pigs* and adapt it to the present time.

Lesson 19: Design Technology: Houses for Puffy Pigs

Students continue their work with *The Three Little Pigs* and conduct tests to determine what kind of structure could withstand a "huffing and puffing" test. They also discuss the way houses vary by climate and community.

Lesson 20: Building Houses for Puffy Pigs

In this lesson, students work in their cooperative learning teams. Using the design and construction principles they have learned, they design, build, and test the strength of a house for their puffy pigs.

Lesson 21: Construction Challenge

In this lesson, students conduct a variety of experiments to learn some basic principles of construction and design. They construct a model skyscraper and mini-domes.

Lesson 22: The Power of the Sun

In this activity, students discuss the ways people use natural resources as a source of energy in their homes. The idea of heating homes with solar energy is introduced. Each student builds a model house out of paper to find out how sunlight can be used to heat homes.

Lesson 23: The Solar House Experiment

Students go outdoors to conduct a solar house experiment in small groups. House windows are covered and uncovered, and the end results are observed. Students record and graph the results.

Lesson 24: Discussing the Solar House Experiment

Students discuss the results of their solar house experiments. The class summarizes the results and then draws conclusions. Students work in cooperative learning groups, write in their journals about the greenhouse effect, and construct a class temperature or weather chart.

Lesson 25: The Solar Water Heater Experiment

In this lesson, students discuss conventional home water heaters and, using aluminum pie pans and sunlight, conduct an experiment to heat water.

Lesson 26: Discussing the Solar Water Heater Experiment

In this lesson, students calculate the net temperature change of their own solar water heater experiment, share the results with other members of their groups, and then discuss the results with the entire class.

Lesson 27: What Have We Learned?

This lesson helps students summarize what they have learned in the last nine lessons. They have had considerable practice making predictions, conducting experiments, and charting results. They apply what they have learned by writing a group story and designing a class chart.

Resumen

Lección 18: Introducción a la tecnología del diseño

Basándose en el cuento de *Los tres cochinitos,* los alumnos exploran de qué otras maneras podrían haber construído sus casas los cochinitos. También vuelven a escribir el cuento y lo adaptan a la época actual.

Lección 19: Tecnología del diseño: Casas para los cochinitos

Los alumnos siguen trabajando con los cochinitos y hacen pruebas para determinar qué tipo de estructura podría resistir una prueba de "soplar y resoplar". También discuten cómo varían las viviendas, según el clima y la comunidad.

Lección 20: Construyendo casas para los cochinitos

En esta lección, los alumnos trabajan en sus equipos de aprendizaje cooperativo. Utilizando los principios de diseño y construcción que han aprendido, diseñan, construyen y prueban la resistencia de una casa para sus cochinitos.

Lección 21: El reto de construir

En esta lección, los alumnos hacen varios experimentos para aprender algunos principios básicos de diseño y construcción. Construyen un rascacielos modelo y unos mini-domos.

Lección 22: El poder del sol

En esta lección, los alumnos discuten cómo la gente usa recursos naturales como energía en sus hogares. Se presenta la idea de calentar el hogar con energía solar. Cada alumno construye una casa modelo en papel, para investigar cómo se puede utilizar la luz del sol para calentar casas.

Lección 23: El experimento de la casa solar

Los alumnos salen afuera para hacer un experimento con una casa solar en grupos pequeños. Se observan los resultados tapando y destapando las ventanas. Los alumnos registran los resultados y hacen gráficas.

Lección 24: Conversamos sobre el experimento de la casa solar

Los alumnos discuten los resultados de sus experimentos de casas solares. En grupo, hacen un resumen de los resultados y luego sacan conclusiones. Trabajan en equipos de aprendizaje cooperativo, escriben en sus diarios acerca del "efecto de invernadero" y hacen una gráfica de la temperatura del ambiente.

Lección 25: El experimento del calentador de agua solar

En esta lección los alumnos discuten los calentadores de agua convencionales y luego hacen un experimento de calentar agua utilizando trastes de aluminio y luz solar.

Lección 26: Conversamos sobre el experimento del calentador de agua solar

En esta lección, los alumnos calculan el cambio neto de temperatura en su propio experimento de calefacción solar de agua, comparten los resultados con los demás miembros de su equipo y luego discuten los resultados con todo el grupo.

Lección 27: ¿Qué hemos aprendido?

Esta lección ayuda a los alumnos a resumir lo que han aprendido en las últimas nueve lecciones. Los alumnos han tenido bastante práctica en hacer predicciones, hacer experimentos, y hacer gráficas de los resultados. Aplican lo que han aprendido al redactar un relato y diseñar una gráfica de la clase.

Objectives

By the end of this unit, students will be able to:

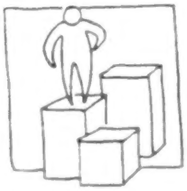
1. Determine fairness in testing and experimentation.
2. Conduct a simple test of a simple machine.
3. Make predictions about the results of experiments.
4. Describe in writing the results of their tests.
5. Design and construct a simple machine.
6. Identify the energy needs of their households.
7. Realize the importance of models in science experimentation.
8. Graph the results of an experiment.
9. Calculate net temperature changes in an experiment.
10. Describe how the greenhouse effect works.

Objetivos

Al terminar esta unidad los alumnos podrán:

1. Determinar si sus pruebas y experimentos son válidos y justos.
2. Hacer una prueba sencilla de una máquina sencilla.

3. Pronosticar los resultados de los experimentos.
4. Describir por escrito los resultados de sus pruebas.
5. Diseñar y construir una máquina sencilla.
6. Identificar qué necesidades de energía tienen sus hogares.
7. Comprender la importancia de los modelos en la experimentación científica.
8. Hacer gráficas de los resultados de un experimento.
9. Calcular los cambios netos de temperatura en un experimento.
10. Describir cómo sucede el "efecto de invernadero".



Operating Grade Level

The first four lessons in this unit are appropriate for students in grades three to five. The activities in the next five lessons, based on the GEMS materials, were originally intended for grades four through eight. Please review the content of each lesson to see if it is appropriate for the students in your group, and make the necessary adjustments. This session will introduce parents to the ADP-MAS lesson focusing on the basic shelter needs of animals and humans.

Nivel de grado

Las cuatro lecciones iniciales de esta unidad son apropiadas para los grados 3-5. Las actividades de las cinco lecciones siguientes, basadas en el material de GEMS, originalmente se diseñaron para los grados 4-8. Es importante revisar el contenido de cada lección para ver si es apropiado para los alumnos de su grupo y hacer las adaptaciones necesarias. Al leer toda la unidad antes de presentarla, usted podrá decidir qué actividades funcionarán exactamente como se describen y cuáles habrá que modificar. Al empezar cada lección, pregúntese qué elementos son adecuados para el grupo y cuáles no.

Suggested Quote/Cita sugerida

The following quote, or one of your choosing, may be useful to initiate or continue discussions about ideas that are important in this unit and these lessons.

The realized man is a building that is never finished.

—Eugenio María de Hostos, in *Para todos los días: Hostos, aforismos*

Mr. Hostos was a Puerto Rican thinker, educator, author, and abolitionist. He lived and worked in Puerto Rico, Spain, New York City, and Venezuela. Among his numerous lifetime achievements was the founding of a teacher's college in the Dominican Republic, and the authoring and long-time advocacy of an Antillean Confederation (a proposal to have the Greater Antilles—Cuba, the Dominican Republic, Haiti, Puerto Rico and Jamaica—work together as a unified body).

El hombre completo es un edificio que no se acaba nunca.

—Eugenio María de Hostos

You may want to do the following with the quote:

☆ Introduce the quote to students.

☆ Ask students to write it on newsprint and place it in a visible place such as the wall.

☆ Talk about the author.

☆ Brainstorm possible meanings and ways in which those meanings apply to the unit and to the lives of students, their families, or their communities.

☆ Ask students if the quote reminds them of something their parents, grandparents, or other family members would have said or agreed with.

☆ Ask students to re-state the quote in their own words (individually or in the group).

☆ Look for opportunities to relate the quote to language arts activities or "Our Creative World" activities in work stations.

☆ Create a class "quote file" to which students can add quotes from this curriculum as well as those parents, grandparents, or other family members may share with them during the course of Academia.

☆ Ask students and adults to send in favorite sayings or proverbs of friends or family members, lyrics from songs, passages from books, or original contributions that relate to math and science and nature or the environment, or to themes like perseverance, courage, determination, inspiration, identity, uniqueness, or diversity.

Usted podría hacer lo siguiente con la cita:

☆ Introducir la cita a los alumnos.

☆ Pedir a los alumnos que escriban la cita en un papel grande y que lo pongan en un lugar visible como la pared.

☆ Repasar posibles significados y formas en las que estos significados puedan ser aplicables a la unidad y la vida de los estudiantes, sus familias o comunidades.

☆ Preguntar a los alumnos si esta cita les recuerda de algo que sus padres, abuelos u otros familiares les hayan dicho o algo con lo que estarían de acuerdo.

- ☆ Pedir a los alumnos que vuelvan a plantear la cita en sus propias palabras (individualmente o en grupo).
- ☆ Buscar oportunidades para relacionar la cita con las actividades de lenguaje o las actividades de "Nuestro mundo creativo" en los centros de trabajo.
- ☆ Crear un "archivo de citas" de la clase al que los alumnos puedan añadir citas de este manual y los padres, abuelos u otros miembros de la familia puedan compartir con ellos durante el curso de la Academia.
- ☆ Pedir a los alumnos y personas adultas que manden sus dichos favoritos o proverbios de sus amigos o familiares, letra de canciones, pasajes de libros, contribuciones originales, que estén relacionadas con ciencias o matemáticas, la naturaleza o el medio ambiente o a temas como perseverancia, valentía, determinación, inspiración, identidad, singularidad o diversidad.

Cultural Link

Have students research how people's houses and dwellings differ from country to country or in history (e.g., ancient Europe, Africa, or the Americas). After conducting research, have them build models of different homes in other countries or times. A language arts activity is recommended as an accompaniment, to give students a vehicle for the imaginative questions they will be asking in relation to their own lives and the dwellings and peoples they will be studying.

Enlace cultural

Pída a los estudiantes investigar cómo las casas y residencias de la gente se diferencian de un país a otro o en la historia (por ejemplo, en la vieja Europa, Africa o en las Américas). Después de hacer la investigación, pida a los alumnos que construyan diferentes modelos de casas de otros paises o de otros tiempos. Se recomienda una actividad de lenguaje como complemento a esta actividad el cual puede servir a los estudiantes como un vehículo para hacer preguntas imaginativas en relación a sus propias vidas, las residencias y la gente que van a estudiar.

Parent Link Summary

Parent Links attempt to help make meaningful connections between what students learn at Academia and the world around them. In this unit, students learn about how humans build shelters, and how they make use of resources such as the heat generated from the sun. This unit's Parent Links involve families in discussions specifically related to Academia lessons and parents'

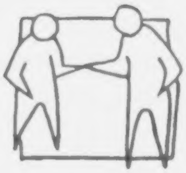
cultural and personal experience as they conduct a weatherization survey of their homes, compare myths, build a story together, and make dried fruit.

Encourage students to write, draw, or talk about what they learned from their parents in the previous lesson's Parent Link during the Daily Homework/ Learning Option. Whenever possible, collect students' writing, drawings, or projects to share at the PAP meetings, to display on a bulletin board at the end of the unit, or to be acknowledged in other ways.

Resumen de enlaces familiares

La intención de los enlaces culturales es ayudar a hacer conecciones significativas entre lo que los estudiantes aprendieron en la Academia y el mundo que los rodea. En esta unidad, los estudiantes aprenden acerca de cómo los seres humanos construyen sus viviendas y cómo hacen uso de los recursos como el calor generado por el sol. Los enlaces familiares de esta unidad involucran a las familias en discusiones específicamente relacionadas a las lecciones de la Academia y la experiencia personal y cultural de los padres en la conducción de una inspección de las condiciones de sus casas, una comparación de mitos, el desarrollo de un relato y en hacer fruta seca.

Incentive a los estudiantes a escribir, dibujar o hablar acerca de lo que han aprendido de sus padres en los enlaces familiares de las lecciones previas durante la opción de tarea para la casa. Siempre que sea posible, recoja lo que los estudiantes escribieron, dibujaron o los projectos para compartir con los padres en la reunión de padres, para exhibirlos en el tablero informativo al final de la unidad o para que sean reconocidos de otras formas.



Parents as Partners Link

This session will introduce parents to the ADP-MAS lesson focusing on the basic shelter needs of animals and humans.

The issue of shelter is very important to many ADP-MAS students and their families. Many of our students come from neighborhoods with older housing. This session allows PAP participants to explore the objectives of the unit and provides them with an opportunity to meet a resource person who can answer questions related to the subject.

An architect could be brought in to discuss how buildings are planned and constructed. If the PAP coordinator wants to use this meeting to focus specifically on the curriculum, s/he can follow up the presentation by asking the architect to introduce Handout 21.1, "Reach for the Sky." This activity will allow parents to construct their own paper-cup skyscrapers and compete to see who can build the highest. The activity is sure to bring a great deal of amusement to the group.

The PAP coordinator can also take advantage of this unit's theme to introduce resources to the group that relate to issues of "shelter" or "home" in the community. For example, city representatives of free paint and weatherization programs can make presentations to PAP members and provide them with valuable resources they may not have had access to before. Parents can be asked for recommendations for other community resource persons (for example, real estate or home buying program officials).

To enhance and focus on the lessons learned during the "Reach for the Sky" activity, tell parents how good science programs have certain characteristics; for example, they allow students to:

- Learn how to "find out" by using tools, records, experiences and observations.
- Practice skills in order to become good at them.
- Think for themselves and recognize false claims.
- Work cooperatively in groups.

A discussion about the experiences of parents building their own skyscrapers can follow, addressing how the characteristics above related to the ADP-MAS activity.

Suggested resources for this meeting are:

- Overview and objectives from Unit 3, "Human Habitat."
- ADP-MAS Handout 21.1, "Reach for the Sky."
- Materials required for the above activity.
- Resource person(s): local architect, and home improvement program representative.

Reunión de padres

Esta sección va a introducir a los padres la lección de ADP-MAS que enfoca el tema de las necesidades básicas de resguardo para los seres humanos y los animales.

La cuestión del albergue es un tema muy importante para muchos estudiantes de ADP-MAS y sus familias. Muchos de los estudiantes vienen de vecindarios con viviendas viejas. Esta sección permite a los participates de la reunión de padres explorar los objetivos de la unidad y les da la oportunidad de conocer a personas que pueden responder a preguntas relacionadas con este tema.

Se puede invitar a un arquitecto para que hable acerca de cómo se planean y se construyen los edificios. Si el coordinador de la reunión de padres quiere usar esta reunión para enfocarse específicamente en el manual, él/ella puede seguir la presentación pidiendo al arquitecto que introduzca la Hoja de trabajo 21.1 "Cómo se construyen los rascacielos". Esta actividad le permitirá a los padres

construir sus propios rascacielos de vasos de papel y ver quién puede construir el rascacielos más alto. La actividad seguramente brindará mucha diversión al grupo.

El coordinador de la reunión de padres también puede sacar ventaja del tema de esta unidad para introducir recursos que estén relacionados con el "albergue" o "vivienda" en la comunidad. Por ejemplo, pueden hacer presentaciones para los participantes de la reunión de padres los representantes de la ciudad que brindan pintura gratuita y los representantes de programas que brindan ayuda para desastres naturales. Estos les proveerán información muy valiosa. Pida a los padres que recomienden otro tipo de representantes de la comunidad (por ejemplo, un agente de bienes y raíces, o un ofical del programa de compra de casas).

Para realzar más y enfocarse en la lección que se aprendió durante la actividad de "Cómo se construyen los rascacielos", diga a los padres que los programas buenos de ciencias y matemáticas tienen ciertas características. Por ejemplo, estos le permiten a los estudiantes:

- ☆ Aprender a "investigar" usando herramientas, registros, experiencias y observaciones.
- ☆ Practicar sus habilidades para llegar a ser buenos en la rama.
- ☆ Pensar por sí mismos y reconocer afirmaciones falsas.
- ☆ Trabajar cooperativamente en grupos.

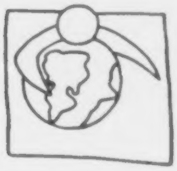
Puede seguir una conversación acerca de la experiencia que los padres tuvieron al construir sus rascacielos para mencionar cómo las caraterísticas que se mencionan arriba se relacionan con la actividad de ADP-MAS.

Los siguientes recursos se sugieren para la reunión:

- ☆ El resumen y los objetivos de la Unidad 3, "Habitat de los seres humanos".
- ☆ Hoja de trabajo 21.1 de ADP-MAS, "Como se construyen los rascacielos".
- ☆ Materiales requeridos para la actividad de arriba.
- ☆ Un invitado: un arquitecto local, un representante del programa de mejoramiento de vivienda.

Lesson 18

Design Technology: Introduction
Introducción a la tecnología del diseño



Overview

Based on the story of *The Three Little Pigs*, students explore other options the pigs might have had in building their houses. They also rewrite the story of the *The Three Little Pigs* and adapt it to the present time.

Resumen

Basándose en el cuento de *Los tres cochinitos*, los alumnos exploran qué otras opciones tenian los cochinitos para construir sus casas. También pueden volver a escribir el cuento y adaptarlo a la época actual.

Key Skills

Predicting

Observing

Recording

Writing

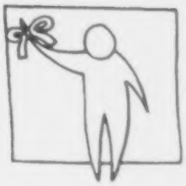
Destrezas claves

Hacer predicciones

Observar

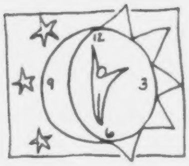
Registrar

Redactar



Preplanning

1. Review *The Three Little Pigs* in the language(s) you plan to use. (It is available in Spanish from Lectorum Publishers and Hispanic Books Distributors.) An updated version of this classic, *The True Story of the Three Little Pigs*, effectively addresses uses of light and heavy materials. (This book is also available in Spanish from Lectorum Publishers.)
2. Clear a square or rectangular table(s) large enough so that all the children fit around it shoulder-to-shoulder on their knees, or sitting on chairs. They're going to be blowing objects across the table; so, if they kneel, they should be tall enough to have their heads above the table.



Suggested Time

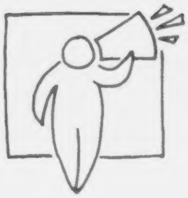
10 minutes—Welcoming
45 minutes—Homework/Learning Options
20 minutes—Huffing and Puffing Game
25 minutes—Story and Discussion
15 minutes—Journal
5 minutes—Closing

2 hours total

Materials

A teacher and teaching assistant are needed to implement this lesson. Prepare the following materials:

- A copy of the *Three Little Pigs* in the appropriate language.
- A ping pong ball.
- A tennis ball.
- A baseball.
- A xerox copy of the *Three Little Pigs* for each cooperative learning group.



Suggested Quote/Cita sugerida

The realized man is a building that is never finished.

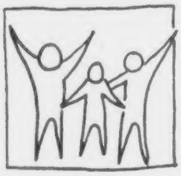
—Eugenio María de Hostos, in *Para todos los días: Hostos, aforismos*

Mr. Hostos was a Puerto Rican thinker, educator, author, and abolitionist.

El hombre completo es un edificio que no se acaba nunca.

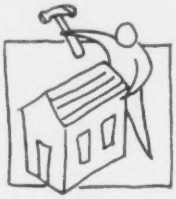
—Eugenio María de Hostos

SESSION PLAN



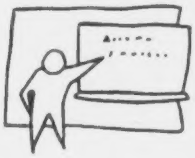
Welcoming (10 minutes)

Welcome children and take attendance. Assign children or work groups to the tasks of charting today's attendance, and charting today's weather and/or temperature. Preview the day's lesson.



Homework (45 minutes)

Students may use this time to complete homework, receive individual tutoring or assistance, or engage in free reading. Teams should also add to their wordbanks any new words or terms they have learned today.



Curriculum

Huffing and Puffing Game (20 minutes)

Divide students into two L-shaped teams, such that opposing teams are on opposite sides of the table. Have students kneel around the table, shoulder-to-shoulder, if feasible. Tell them that the object of the game is for a team to knock a ball off the edge of the table on the opposing team's side. They cannot touch the table or use their hands to push the ball. They may only use the energy of wind (i.e., they have to blow the ball off the table). Have everyone move at least one inch away from the table's edge so they cannot protect their "goal line" with their bodies.

Set a ping pong ball in the middle of the table, step back and let them begin. Students have to work together to try to blow the ball off the opposite edge of the table. When they succeed, their team scores a point. Let them play for a few minutes.

Ask them:

"How hard was it to make the ping pong ball move by blowing it? Is the ping pong ball heavy or light? Do you think you'd have to work harder with a heavier ball?"

Take the ping pong ball away and replace it with a tennis ball. Let the students play the game again for a few minutes. Then, let them try the game with the baseball.

Pregunte a los alumnos:

"¿Cuan difícil fue mover la pelota de ping pong sólo soplando? ¿Es pesada o liviana la pelota de ping pong? ¿Tendrán ustedes que hacer un esfuerzo más grande para mover una pelota más pesada?"

Retire la pelota de ping pong y reemplázela con una de tennis. Permitale a los estudiantes jugar el juego nuevamente por algunos minutos. Después de esto, permítale tratar el mismo juego con una pelota de béisbol.

Ask them:

"Which ball was the hardest to move? Why? Which one took more energy to move, the heavy ball or the lighter one?"

Pregunte a los alumnos:

"¿Cuál de las pelotas fue la más difícil de mover? ¿Porqué? ¿Para cuál de las pelotas, la pesada o la liviana, se necesitó más energía para moverla?"

Story and Discussion (25 minutes)

Gather students together and read or tell the story of *The Three Little Pigs*. Focus the students' attention on the building materials that the pigs used by asking questions such as:

- ☆ What happened to the first pig's house? Why?
- ☆ Is straw heavy or light?
- ☆ What happened to the second pig's house? Why?
- ☆ Are sticks heavy or light?
- ☆ What else could the pigs have used to build their houses?

Pregunte a los alumnos

- ☆ ¿Qué le pasó a la casa del primer cochinito? ¿Porqué?
- ☆ ¿La paja es pesada o liviana?
- ☆ ¿Qué le pasó a la casa del segundo cochinito? ¿Porqué?
- ☆ ¿Los palos son pesados o livianos?
- ☆ ¿Qué otras cosas podrían haber usado los primeros dos cochinitos para hacer sus casas?

Rationale...

After reading the story, it is important to ask the questions suggested. These questions should help students draw the connection between the scientific concept being introduced here and its application.

Razón fundamental...

Después de leer el cuento es importante hacer las preguntas que se sugieren. Estas deben ayudar a los alumnos a comprender la relación entre el concepto científico que se presenta y su aplicación.

Journal (15 minutes)

Ask students to think about how they would rewrite the story of *The Three Little Pigs*. To help them, explain that the story was originally written a long time ago and, since then, the world and people have changed. Now, it is time to rewrite the story and relate it to our world today. Work together as a whole group to brainstorm some ideas on how to rewrite the story to relate it to the present. Offer a webbing exercise or a brainstorm exercise here which can be added as a handout. Have students write their ideas in their journals. If time permits, encourage them to try rewriting the story.

Closing (5 minutes)

Ask students to share briefly what they've been doing and learning today. Ask them to make some guesses about what kinds of materials are heavy and strong, and would make good materials for houses. They will have an opportunity to share their story ideas in upcoming lessons.

Tell students that this lesson, and others in this unit, focus on how humans build shelters. Remind them how they learned in Unit 2 that shelter was one of the five basic needs of humans and animals.

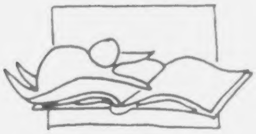
Parent Link

Have students share with parents what they learned about heavy and light materials at Academia today. Have they themselves ever been involved in the construction of a house? Has another family member? What does it take to build a house? How many people must work together on it? What skills are necessary for them to have? How long does it take? If no one in the family has any knowledge in this area, have parents take students to a local real estate agency to look at local houses available for sale. Most agencies have photos of available houses on display. Houses are often identified by their structural style in the captions. If they are not, parents can set up an appointment to see an agent or visit during slow hours, and engage them in a

discussion about the names of the different styles, their origins, etc. Ask students to share their findings in class.

Enlace familiar

Pída a los estudiantes que compartan con sus padres lo que han aprendido sobre los materiales pesados y livianos en la Academia hoy. ¿Han estado los padres alguna vez envueltos en la construcción de una casa? ¿Algún otro miembro de la familia? ¿Qué involucra la construcción de una casa? ¿Cuántas personas tienen que trabajar juntas para construir una casa? ¿Qué habilidades necesitan tener las personas para construir una casa? ¿Cuánto tiempo toma construir una casa? Si ninguno en la familia tiene conocimiento sobre esta área, pida a los padres que lleven a sus hijos a una agencia local de bienes y raices para que vayan a ver las casas que estan disponibles para la venta. La mayoría de las agencias tienen fotografías de estas casas en exhibición. Si esto no es posible, los padres pueden hacer una cita con un agente para visitar durante las horas que no están muy ocupados y pueden entablar una conversación acerca de los nombres de los diferentes estilos de casas, sus orígenes, etc. Pida a los alumnos compartir sus investigaciones con la clase.



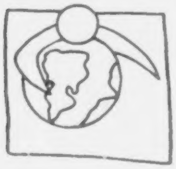
Literature Link

Gail Gibbon's How a *House is Built* takes an inspiring look at how the surveyor, heavy machinery operators, carpenter crew, plumbers and other workers build a house. It includes pictures of different types of houses and the different materials with which they are built and pictures of eight simple shelters of the past. Recommended for grades K-4.

In *Connections! Buildings*, Iqbal Hussain takes a wonderful question-and-answer approach to architecture. A colorful and interactive book, it explores buildings and dwellings, how they are made, how buildings affect the way we live and feel, and why they look the way they do. Recommended for grades 4-8.

Lesson 19

Design Technology: Houses for Puffy Pigs
Tecnología del diseño: Casas para los cochinitos



Overview

In this lesson, students work in their cooperative learning groups. Using the principles they have learned, students design, build, and test the strength of a house for their puffy pigs. In "Background for the Teacher," information about the way houses vary by climate and community is discussed.

Resumen

En esta lección, los alumnos trabajan en sus equipos de aprendizaje cooperativo. Utilizando los principios que han aprendido, diseñan, construyen y prueban la fuerza de una casa para sus cochinitos. La sección de información para el/la maestro/a provee información sobre cómo las casas varian de clima a clima y de comunidad a comunidad.

Key Skills

Classifying

Predicting

Observing

Recording

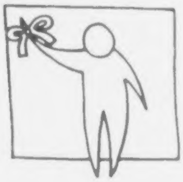
Destrezas claves

Clasificar

Hacer predicciones

Observar

Registrar



Preplanning

1. Collect pictures from books of structures damaged by windstorms, hurricanes, or earthquakes to show children what happens when structures are not strong enough to withstand the elements. Real-world examples of hurricanes and earthquakes can help students understand that design technology has important everyday applications.
2. Prepare the bags of materials for each team.

3. Make sure student journals are accessible.
4. Review "Background for the Teacher."

Background for the Teacher

People in different parts of the world have different materials they can use to build their homes and other structures. When building a home, they have to think of how to use these materials to build a house that will work well for where and how they live.

In the southwestern part of the United States, where there is a lot of clay and little wood, people build houses from adobe, a mixture of clay, straw, and water. Adobe houses have very thick walls that keep the houses cool in the hot, dry desert weather. Adobe houses would not be good in places where it rains a lot because too much water makes adobe crumble.

Many native peoples in Alaska and Canada built their houses out of sod or snow. These dome-shaped houses are called igloos. The dome shape of the igloo makes it very strong and able to withstand powerful winter storms.

Some Native Americans used to build dome-shaped houses made of poles, leaves, and tree bark. These houses were called wigwams. Native Americans who moved often would build cone-shaped teepees out of buffalo skins or bark. Teepees could be easily built and taken apart quickly. Some Native Americans lived in more permanent structures called lodges. These were made from logs and sod.

When early American settlers came to New England, they found the ground covered with large stones. They used these to build stone houses and fences that you still see in New England today. Most houses in the United States today are built of wood, brick, stone, concrete, aluminum, or even glass.

Información para el/la maestro/a

En diferentes partes del mundo, las personas tienen distintos materiales que pueden usar para construir sus casas y otros edificios. Cuando hacen una casa, tienen que pensar cómo usar estos materiales para que la casa funcione bien en dónde y cómo viven.

En la parte sudoeste de los Estados Unidos, donde hay mucho barro y poca madera, la gente hace casas de adobe, una mezcla de barro, paja y agua. Las casas de adobe tienen paredes muy gruesas que las mantienen frescas en el clima caliente y seco del desierto. Las casas de adobe no funcionarían bien donde llueve mucho, porque con demasiada agua el adobe se desmorona.

Muchos nativos de Alaska y Canadá construían sus casas de césped o nieve. Estas casas en forma de bóveda/domo se llaman iglús. La forma de domo del iglú hace que sea muy fuerte y pueda resistir las tormentas del invierno.

Algunos indígenas americanos construían casas en forma de domo hechas de postes, hojas y corteza de árbol. Estas casas se llamaban "wigwams". Los indígenas que se mudaban frecuentemente de un lugar a otro hacían "típis" en forma de cono, de piel de búfalo o de corteza. Los "típis" eran fáciles de construir y se desarmaban rápidamente. Algunos indios vivían en estructuras más permanentes, llamados *lodges*, hechas de troncos y césped.

Cuando los primeros pobladores blancos llegaron a Nueva Inglaterra, encontraron la tierra cubierta de piedras grandes. Las usaron para construir casas y cercas de piedra que todavía se ven en Nueva Inglaterra hoy día. La mayoría de las casas modernas en los Estados Unidos están construídas de madera, ladrillo, piedra, concreto, aluminio y hasta de vidrio.

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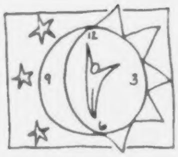
5. Review the following terminology:

* ***hypothesis***	* ***hipótesis***
* ***valid***	* ***válido***
* ***mass***	* ***masa***
* ***strength***	* ***fuerza***
* ***resistance***	* ***resistencia***
* ***biased***	* ***parcial***



Suggested Time

10 minutes—Welcoming
45 minutes—Homework/Learning Options
15 minutes—Discussion about Construction of Houses
30 minutes—Conducting Fair Tests
15 minutes—Journal
5 minutes—Closing

2 hours total

Materials

A teacher and teaching assistant are needed to implement this lesson with ease. In addition, the following materials need to be prepared:

- One resealable quart-size plastic bag for each cooperative learning group, containing assorted objects such as: a cotton ball, a scrap of plastic wrap, a wooden block, a scrap of foil, a stone, a marble, a short piece of yarn or string, a scrap of paper, a small piece of plastic foam, a coin, a wooden craft stick, and a thick rubber band.

Materials for a "puffing machine" for each team will also be needed:

- Two new thick kitchen sponges.
- A resealable, quart-size plastic bag.
- A drinking straw with a flexible end.
- Masking tape.
- An electric fan.
- Student journals and pencils or pens.

Suggested Quote/Cita sugerida

The realized man is a building that is never finished.

—Eugenio María de Hostos, in *Para todos los días: Hostos, aforismos*

Mr. Hostos was a Puerto Rican thinker, educator, author, and abolitionist.

El hombre completo es un edificio que no se acaba nunca.

—Eugenio María de Hostos

SESSION PLAN

Welcoming (10 minutes)

Welcome children and take attendance. Assign children or work groups to the tasks of charting today's attendance, and today's weather and/or temperature. Preview the day's lesson and show students the materials in one of the bags. Tell them to choose one object silently that they think could be easily moved by blowing on it, and one object they think could not. Remind them how easy it was to blow the ping pong ball and how much harder they had to work to blow the tennis ball.

Homework/Learning Options (45 minutes)

Students may use this time to complete homework, receive individual tutoring or assistance, or engage in free reading. Groups should also add to their wordbanks any new words or terms they have learned today.

Curriculum

Discussion about the Construction of Houses (15 minutes)

Discuss with students how people in different climates build their homes differently and with different materials. Make sure they understand that weather conditions are different in different areas: some communities have to deal with tornadoes and hurricanes, very cold weather, lots of rain, extreme heat, seasonal flooding, earthquakes, etc. Show them some of the pictures you have collected about buildings damaged by high winds or earthquakes, or poorly constructed buildings that fell down on their own. Ask students why it's important to choose the right kind of building materials and know how to build strong structures.

Conducting Fair Tests (30 minutes)

Remind students that the guesses they make about whether or not various items can be moved by wind are called ***hypotheses**, and that they can see if their hypotheses are ***valid** by conducting experiments. Today, each cooperative learning group will be conducting experiments or "fair tests" to test their hypotheses, and to see which items in the bag can be moved most easily by puffs of wind.

When we are testing hypotheses, as we did in Unit 1, it's important that our tests be fair. To illustrate a test that is unfair or ***biased**, select two volunteers. Try to select students who are mismatched in age or size so that one can obviously blow with much greater force than the other.

Tell students:

"Will one of you please hand me the object that you think will move? Will the other person give me the object that you think will not move? Will both of you please kneel here at the starting line?"

Diga a los alumnos:

"¿Alguno de ustedes podría hacerme el favor de pasarme el objeto que creen que se moverá? ¿Podría otro estudiante pasarme el objeto que creen que no se moverá? ¿Podrían ustedes dos hincarse aquí en la linea de sálida?"

Place both objects directly in front of the students and direct them to blow as hard as they can to try to move the objects. When you say "stop," note where the objects have landed. Did one move farther than the other? Could this have been at all related to the strength of the person who blew it?

Now, place the heavier object directly in front of the student who chose it. Place the lighter object several meters away. Give a signal for both students to try to move the object by blowing on them. Encourage comments about the test. Ask them if this was a fair test. If not, what was unfair about it?

Con dos voluntarios y los dos objetos que hayan escogido, van a demostrar el concepto de una prueba válida. Ponga los objetos directamente en frente de los alumnos y pídales que soplen lo más fuerte que puedan. Cuando hayan terminado la prueba, pregúnteles: ¿Se movió uno más lejos que el otro? ¿Por qué? ¿Tuvo esto algo que ver con el tamaño o la fuerza de la persona que lo sopló?

Para hacer la segunda prueba, ponga el objeto más pesado directamente frente al alumno que lo escogió. Ponga el objeto más liviano a varios metros de distancia frente al otro alumno. Luego, pida a los alumnos que soplen los dos objetos. Cuando hayan terminado, pregúnteles: ¿Cuál fue el resultado de esta prueba? ¿Piensan que esta prueba fue válida? ¿Por qué no? ¿En qué aspecto no fue válida?

Help students to understand that, in order for the test to be fair, the objects should have been the same distance from the starting line. Also, help them understand that even when both objects were at the starting line, the students may not have been able to blow with equal force.

Ask students to sit with their cooperative learning groups. Assign some basic roles to the members of the cooperative learning groups: a supply monitor, a timekeeper, a recorder, a reporter, and a participation monitor.

Working in groups, show students how to make a "Puffing Machine:"

- ☆ Place the two sponges in the plastic bag.
- ☆ Place the straw between the sponges with the flexible end sticking out of the bag.
- ☆ Seal the bag and tape it to be sure it is sealed around the straw. Then, push down on the sponges to make a puff of air.

Ask students:

"How would you perform a fair test with the puffing machine?"

Pregunte a los alumnos:

"¿Cómo harían ustedes una prueba válida con la máquina de soplar?"

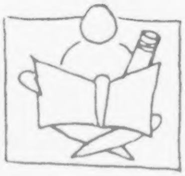
Allow a few minutes for students to discuss with their group how they will conduct their tests. They should agree on a team plan before proceeding. It is not necessary for teams to conform to a classroom standard. Each team should design its own test. For instance, some students might notice that how close an object is to the end of the straw makes a difference. These students might then decide how close to place the objects. Students might notice that the machine needs a few seconds to refill with air. Teams should, therefore, decide how long to wait between tests; possibly, counting "1-2-3" before reactivating their machines.

Tell students:

"Now conduct your tests of the objects in your bags, and use the results to sort the things into two groups: those that moved and those that did not move." The recorder in each group should write down the results of the tests. When the groups have finished their tests, ask the reporters from each group to share their results.

Diga a los alunos:

"Necesitan unos minutos en sus grupos para decidir cómo hacer sus pruebas. Cada grupo puede tener un diseño distinto". Cuando hayan decidido su método, dígales: "Ahora hagan sus pruebas con los objetos en sus bolsas. Según los resultados, separen los artículos en dos grupos: los que se mueven y los que no se mueven".



Journal (15 minutes)

Instead of just recording the results of their work, allow students the opportunity to write a letter to the three little pigs telling them what their tests revealed, or to continue writing their version of *The Three Little Pigs*.

Closing (10 minutes)

Collect the puffing machines, and have students return their journals to their storage place. Ask one or two students to share with the class the letter they have written to the *Three Little Pigs*. Compliment their work and briefly review any new vocabulary or terminology they learned today.

Parent Link

Have students discuss with their parents the different kinds of houses they grew up in, or those family members in other countries did. Students can have parents draw pictures of the homes as they remember them. They can ask parents if the houses were comfortable (warm or cool), what materials they were made of, and who, if they know, may have designed them. Have students present to the class the details they learned.

Enlace familiar

Pida a los estudiantes que discutan con sus padres sobre los diferentes tipos de casas en las cuales ellos han crecido o las de familiares que han crecido en otros paises. Los alumnos pueden pedir a sus padres que dibujen las casas como las recuerdan. Pueden preguntar a sus padres si las casas eran cómodas (templadas o frias), de qué materiales estaban construidas y quién las diseñó (si lo saben). Pida a los alumnos presentar a la clase los detalles de lo que aprendieron.

Literature Link

Jane D'Alelio's *I Know That Building! Discovering Architecture with Activities and Games* is a fabulous sourcebook of educational games and exercises that help students learn, hands-on, about architecture, its history, and applications. Students can build models of a school house, covered bridge, or skyscraper, restore a mosaic, revive a "Main Street," survey a neighborhood, or play a card game about architects. Recommended for grades 3-7.

La Casita (in Spanish), by Virginia Lee Demetrios-Burton, tells the story of a little house on a hill and the arrival of the city to "her" front step. Recommended for grades 2-4.

Lesson 20

Building Houses for Puffy Pigs
Construyendo casas para los cochinitos

Overview

In this lesson, students will work in their cooperative learning groups. Using the design and construction principles they have learned, students will design, build, and test the strength of a house for their puffy pigs.

Resumen

En esta lección los alumnos trabajan en sus equipos de aprendizaje cooperativo. Utilizando los principios de diseño y construcción que han aprendido, diseñan, construyen y prueban la fuerza de la casa para sus cochinitos.

Key Skills

Applying information

Creating a design

Planning

Predicting

Conducting an experiment

Observing

Recording and interpreting results

Destrezas claves

Aplicar información

Crear un diseño

Planear

Hacer predicciones

Hacer un experimento

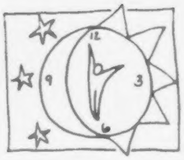
Observar

Registrar e interpretar resultados

Preplanning

1. Make one "puffy" pig for each team by cutting out a pig head from Handout 20.1, and gluing or taping each to a cotton ball.

2. Set up the electric fan on a table in a central location where all groups can use it to test their structures. Place a piece of tape or some mark on the table, several feet from the fan, to indicate where the houses should be placed for a fair test.
3. Place construction materials, supplies, and a puffing machine at each work station.



Suggested Time

20 minutes—Welcoming
45 minutes—Homework/Learning Options
45 minutes—Designing, Constructing, and Testing Houses
10 minutes—Closing

2 hours total

Materials

A teacher can do this activity alone if necessary, but teaching assistants or volunteers to work with each group make the lesson easier to manage. In addition, you will need the following materials:

- A construction materials bag for each group, containing such materials as: toothpicks, craft sticks, foil, plastic wrap, cloth, yarn, scrap paper, cotton balls, straws, plastic foam packing materials, modeling clay, string, cardboard, etc.
- Scissors, glue, and tape for each group.
- Sheets of unlined paper.
- One "puffing machine" for each group.
- Handout 20.1, "Puffy Pigs."
- Cotton ball, tape, and "puffy pig picture" to make a puffy pig for each group.
- One electric fan.
- Student journals.

Suggested Quote/Cita sugerida

The realized man is a building that is never finished.

—Eugenio Maria de Hostos, in *Para todos los dias: Hostos, aforismos*

Mr. Hostos was a Puerto Rican thinker, educator, author, and abolitionist.

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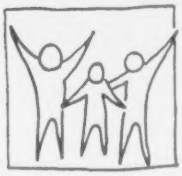


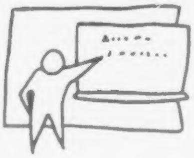
Welcoming (20 minutes)

Welcome students and take attendance. Assign a few students to the task of charting the day's attendance and weather. Preview the day's lesson and recall the story of *The Three Little Pigs*. Ask for a few student volunteers to share with the rest of the class the versions of *The Three Little Pigs* they wrote in their journals.

Review previous work students have done with classifying materials, testing them with the puffing machine, and learning about principles to make buildings strong.

Homework/Learning Options (45 minutes)

Students should use this time to complete homework assignments or engage in free reading.



Curriculum (45 minutes)

Designing, Constructing, and Testing Houses for Puffy Pigs

Have students in each group volunteer to be: a materials specialist, a recorder, a participation monitor, a praiser, a timekeeper, and a reporter.

Tell students:

"Your task today is to apply what you've been learning by designing, building, and testing a house that would protect a puffy pig from the huffing and puffing of the 'Big Bad Wolf'. You will be testing houses with both the puffing machine and the electric fan. Select your building materials and design your houses, keeping in mind what you've learned about heavy and light materials and strength in designs."

Diga a los alumnos:

"Hoy van a usar lo que han aprendido para diseñar, construir y probar una casa que podría proteger a un cochinito del 'lobo feroz'. Van a probar sus casas usando la máquina de soplar y el ventilador. Escojan sus materiales y diseñen las casas tomando en cuenta lo que han aprendido acerca de los materiales pesados y livianos y sobre la resistencia de ciertos diseños".

The students' first task is to design and build a structure that will protect their puffy pig from the puffing machine and, at least, the low speed of the electric fan. They should first discuss and select their building materials. Next, they should draw a design for the structure, then build and test it.

After students have agreed on a design and have worked together to construct it, each team should place the puffy pig in the newly built house, and see what happens when it is placed in front of the puffing machine. Next, have each of the groups place them in front of the electric fan and turn on the fan to low. What happens? What do they think will happen if they turn up the speed of the fan?

After about 25 minutes, ask the groups to report on their designs and their findings. Was any group able to build a house which withstood the low setting on the fan? Did anyone build a house that could withstand higher settings? How would they design house to protect the puffy pig if the "Big Bad Wolf" were going to sit on the house rather than blow it down? Would their building materials and/or design change? Have them imagine the "Big Bad Wolf" weighing as much as a book. Could they design a house that would protect the pig?

Pregunte a los alumnos:

"¿Algún grupo pudo diseñar una casa que resistiera el nivel bajo del ventilador? ¿Pudo alguien diseñar una casa que resistiera el nivel alto? ¿Cómo diseñarían una casa para proteger al cochinito si el 'lobo feroz' se sentara encima de la casa en vez de soplar? ¿Cambiarían los materiales y el diseño? Imagínense que el 'lobo feroz' pesara igual que un libro. ¿Podrían diseñar una casa que protegiera al cochinito?"

Closing (10 minutes)

Ask students to summarize what they have learned about designing houses.

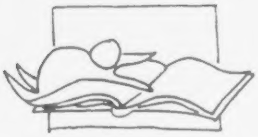
Parent Link

Students can discuss what they have learned in this lesson about the effects of outside conditions on a home. With parents, they can do a survey of the interior of their homes to see where areas of concern may exist that might affect the people inside. Students can identify drafty areas, broken windows, and possible leaky areas. Together, as a family, a strategy could be developed to improve these conditions. Academia staff could also provide information about free city home winterization and paint programs.

Enlace familiar

Los estudiantes pueden discutir con sus familias sobre lo que han aprendido en esta lección acerca de los efectos que tienen las condiciones del clima sobre una

casa. Junto con sus padres pueden hacer una inspección del interior de sus casas para ver qué áreas de preocupación existen que podrían afectar a la gente que vive adentro. Los estudiantes pueden identificar las áreas que tienen corrientes de aire, ventanas rotas y posibles goteras. En familia, pueden desarrollar una estrategia para mejorar estas condiciones. El personal de la Academia podría proveer información sobre los programas de la ciudad de pintura gratuita y programas de ayuda para preparar las casas para el invierno.



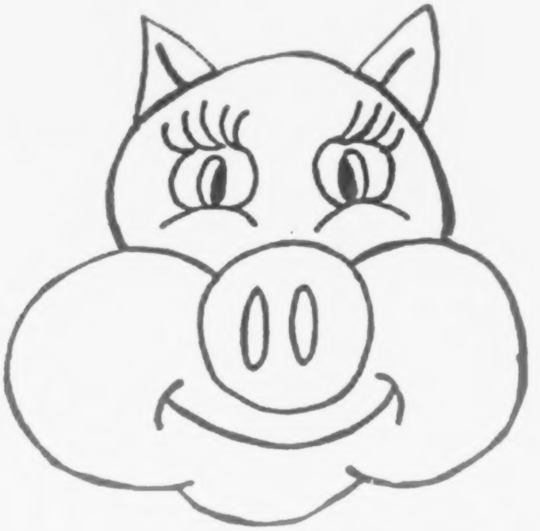
Literature Link

Pueblo, by Charlotte and David Yue, brings the Pueblo people and their environment to life and includes detailed information about their dwellings. (The same authors have written on the igloo and the tepee.) Recommended for grades 5-8.

Tim Woods' *The Aztecs* provides a thorough historical overview of this ancient civilization. Information about the building of the temples provided here is bound to capture the interest of any young reader. Recommended for grades 5 and up.

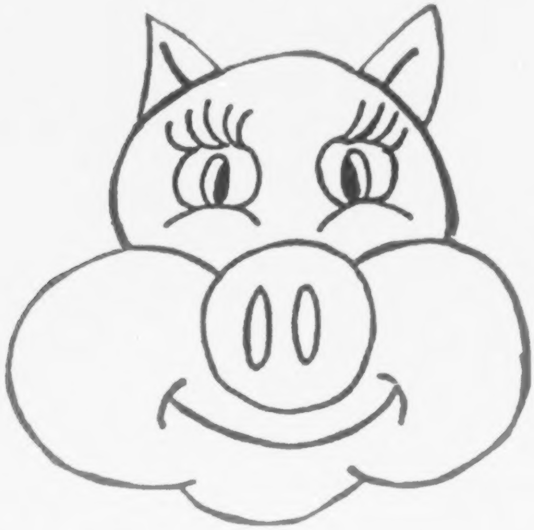
Handout 20.1

Puffy Pigs



Hoja de trabajo 20.1

Cochinitos



Lesson 21

Construction Challenge
El reto de construir

Overview

In this lesson, students conduct a variety of experiments to learn some basic principles of construction and design. Students will consider the following questions: What kind of building materials are available and appropriate for different climate conditions? How can we design structures that work using those materials? Students will work in their cooperative learning groups at three different stations.

Resumen

En esta lección los alumnos hacen varios experimentos para aprender algunos principios básicos de diseño y construcción. Los alumnos consideran las siguientes preguntas: ¿Qué clase de materiales de construcción están disponibles y son apropiados para las condiciones del clima? ¿Cómo podrían diseñar estructuras resistentes usando esos materiales? Los alumnos trabajarán en sus grupos cooperativos en tres diferentes centros de trabajo.

Key Skills

Experimentation

Recording information

Drawing conclusions

Working cooperatively

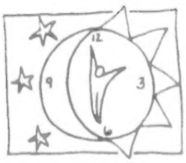
Destrezas claves

Hacer experimentos
Registrar datos
Sacar conclusiones
Trabajar cooperativamente

Preplanning

1. Make sure you have adequate helpers to implement this lesson. Most people will find it easiest to implement this lesson with at least one adult assigned to each work station.

2. Gather the required materials and set up each work station (covering tables with paper where necessary to protect from glue and paste). Mix the dome paste ahead of time. If you are using glue, glue several of the cups together to form two-cup pods (since the glue takes about ten minutes to set, students will need some preformed pods to work with). If you're using masking tape to connect the cups (this is quicker and easier), you can leave this step for the students.
3. Make copies of Handouts 21.1 - 21.5 for students and each adult supervising a work station. Review the activity each adult is to supervise, and make sure each is clear about the objective of the activity and the methods. (You should try some of the activities beforehand.)



Suggested Time

10 minutes—Welcoming
45 minutes—Homework/Learning Options
20 minutes—Work Station I: Reach for the Sky!
20 minutes—Work Station II: Beam Me Up!
20 minutes—Work Station III: The Mighty Dome!
5 minutes—Closing

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2 hours total

Materials

The teacher and two teaching assistants are needed to implement this lesson. Volunteers would also be helpful to prepare materials and help supervise some of the "messy" work of making domes and gluing cups together for skyscrapers. In addition, you'll need the following materials:

- "WonderScience Construction Challenges," Handouts 21.1 through 21.4 in English or Spanish, one for each work station.
- Handout 21.5, "Recording Our Results," for each group at Work Station II.
- Paper and pencils for each group.

Skyscraper Test Materials:

- 30 to 40 seven-ounce plastic or paper cups (10 to 15 cups per group).
- A bottle of white liquid glue or roll of masking tape.
- Several magazines to make a "windstorm."
- Approximately 50 pennies per group.
- An electric fan.

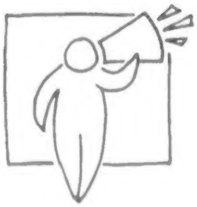
Beam Test Materials:

- Two meter- or yard sticks (one is a backup in case a group should break one).
- Three plastic bags with handles (bags from the supermarket work well).
- 5-10 potatoes.

Dome Test and Building Materials:

- Four egg shell halves for each group.
- A square piece of stiff cardboard for each group (approximately 20 cm x 20 cm).
- Magazines or thin books.
- Paper towels.

Suggested Quote/Cita sugerida



The realized man is a building that is never finished.

—Eugenio María de Hostos, in *Para todos los días: Hostos, aforismos*

Mr. Hostos was a Puerto Rican thinker, educator, author, and abolitionist.

El hombre completo es un edificio que no se acaba nunca.

—Eugenio María de Hostos

Welcoming (10 minutes)

Welcome students and take attendance. Assign children or a cooperative learning group to chart today's attendance and weather. Preview the day's activities, and review the rules you've established for changing from work station to work station. Tell students that today they'll be learning about some important ideas used in construction and design.

Assign some basic student roles to the members of each group: a time keeper, a materials monitor, a recorder, a reporter, a praiser, etc.

Homework/Learning Options (45 minutes)

Students may use this time to complete homework, receive individual tutoring or assistance, or engage in free reading. They should also add to their group wordbanks any new words or terms they have learned today.

Curriculum

Construction Challenges at Work Stations (1 hour; 20 minutes at each one)

Work Station I: Reach for the Sky

Students at this work station will be learning about tall buildings and wind resistance. They will be trying to build the tallest cup skyscraper possible that can stand up to a terrible windstorm. Use the instructions in Handout 21.1 to help students conduct this experiment, and make sure students learn that weighting the base of the skyscraper by adding pennies to the base will help it resist high winds.

Students should build a skyscraper with one, two, three, four, etc. pods of cups, testing each with a student-made windstorm (waving magazines) to see how well it stands up. One or two students should record the results on a piece of paper. How well did your skyscraper withstand the wind? If you've glued the cups together, in order to weight the base by adding pennies to it, you'll want to cut a small slot in the bottom pod and drop the pennies in (like a piggy bank), rather than starting with two new cups, adding the pennies, and gluing them together. If you're using tape, just undo the masking tape for that pod and insert the coins.

Students should conduct their fair tests by not only using the magazines, but also by placing their skyscrapers in front of the electric fan and seeing what happens. They might also be curious about the effect of inverting their weighted skyscraper and conducting a test (e.g., what happens when the weighted pod is on the top?)

Centro de trabajo 1: Construyendo los rascacielos

Los estudiantes en este centro de trabajo aprenderán más acerca los edificios altos y la resitencia al viento. Ellos tratarán de construir el edificio más alto de vasos de papel que puedan y que sea capaz de resitir un ventarrón muy fuerte. Use las instrucciones de la Hoja de trabajo 21.1 para ayudar a los estudiantes a conducir este experimento y asegúrese de que los estudiantes pongan en la base del rascacielos monedas de un centavo para que haga peso y que pueda resistir vientos fuertes.

Los estudiantes deben construir el rascacielos con uno, dos, tres, cuatro, etc. hileras de vasos y probar la resistencia de estos por medio del viento que los estudiantes producen (batiendo una revista). Uno o dos estudiantes deben anotar los resultados en una hoja de papel. ¿Resistió bién tu rascacielos al viento? Si pegó los vasos juntos, córtele una pequeña ranura en la base del primer vaso para que pueda poner las monedas de un centavo que hagan peso (cómo las ranuras que tienen las alcancías) en vez de empezar con dos vasos nuevos, añadiendo las monedas y pegándolos juntos. Si vá a usar cinta adhesiva puede despegar esa hilera solamente y poner las monedas.

Los estudiantes deben conducir una prueba justa no solamente usando la revista, sinó también poniendo sus rascacielos frente a un ventilador eléctrico y ver qué pasa. También tendrán la curiosidad de ver qué pasa si invierten el rascacielos con peso y conducen una prueba (por ejemplo, ¿qué pasa cuando la hilera con peso está en la parte de arriba?)

Work Station II: Beam Me Up!

Students at this station learn about frames and beams, and how to position beams so that they support the most weight. Use the instructions in Handout 21.2 to assist students in conducting this experiment.

Each group should record the results of their experiment, using the matrix in Handout 21.5. A student matrix for this experiment might look like the following:

Figure 1

Recording Our Results

Number of Potatoes	Yardstick with numbers facing up	Yardstick with numbers facing sideways
1	Stick did not bend	Stick did not bend
2	Stick bent a little	Stick did not bend
3	Stick bent a lot	Stick did not bend
4	Stick seemed like it would break, stopped test	Stick did not bend
5		Stick did not bend

Centro de trabajo 2: Poniendo vígas

Los estudiantes en éste centro de trabajo aprenden acerca de los marcos y las vígas y cómo poner las vígas para que soporten mucho peso. Use las intrucciones de la Hoja de trabajo 21.2 para ayudar a los estudiantes a conducir éste experimento.

Cada grupo debe anotar los resultados del experimento usando el modelo de la Hoja de trabajo 21.5. Las anotaciones del estudiante deben parecerse al siguiente cuadro.

Figura 1

Anotando los resultados

Número de papas	Metro con números hacia arriba	Metro con números hacia el lado
1	El metro no se dobló	El metro no se dobló
2	El metro se dobló un poco	El metro no se dobló
3	El metro se dobló mucho	El metro no se dobló
4	Parecia que el metro se iba a romper, detuvimos la prueba	El metro no se dobló
5		El metro no se dobló

Work Station III: The Mighty Dome!

Students at this station will begin to learn about the properties of domes and how strong they are. Use the instructions in Handout 21.3 to help students conduct this experiment. They will conduct the experiment with egg shells. The groups should record the results of their experiment, noting how many magazines or books they were able to place on the shells before they cracked.

Centro de trabajo 3: El gran domo

Los estudiantes en éste centro comenzarán a aprender las propiedades de los domos y ver cúan fuertes son estos. Use las instrucciones de la Hoja de trabajo 21.3 para ayudar a los estudiantes a conducir éste experimento. Los estudiantes conducirán los experimentos con cáscaras de huevo. Los grupos deben anotar los resultados de su experimento, observando cuantas revistas o libros fueron capaces de poner sobre las cáscaras de huevo sin que se rompieran.

Suggestion...

If working with young students or students who are unable to read, make sure an adult is available at each work station to walk students through the directions. You may also decide to substitute the extension activity for this one.

Sugerencia...

Si trabaja con alumnos pequeños o alumnos que no pueden leer, asegúrese de que una persona adulta esté disponible en cada uno de los centros de trabajo para repasar las indicaciones con los alumnos. También podría sustituir la actividad de extensión por esta actividad.

Extension Activity

To reinforce the concept of domes, let students build their own domes and test their strength using Handout 21.4 as a guide. (**Note:** This activity takes a few days!)

Closing (10 minutes)

Make sure all materials have been put away, and that domes have been labeled with each group's name, and left in a secure location to dry. Ask each group to report on the results of their experiments. Ask students to explain why they think they got the results they did, and to discuss the principles of construction they learned today. Write down any key terms from today's lesson.

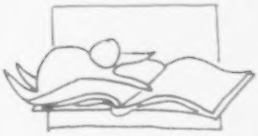
Tell students they'll be doing some additional experiments with their domes when they are dry. How would they explain what they've learned today to their parents or other family members?

Parent Link

Ask parents and students to share with each other their experiences in carrying out the "Reach for the Sky" activity (which parents would have done in the previous PAP meeting). Did anyone find it difficult? Too easy? What was the most challenging part of it? The most fun? What did each learn?

Enlace familiar

Pida a los padres y a los niños que compartan con otros sus experiencias de llevar a cabo la actividad, "¿Cómo se construyen los rascacielos?" (cual los padres habran hecho en la reunión de padres previa). ¿Alguien tuvo dificultad para hacerlo? ¿Les pareció muy fácil? ¿Qué parte fue la más difícil? ¿Qué parte fue la más divertida? ¿Qué aprendieron cada uno de ustedes?



Literature Link

Unbuilding by David Macaulay is a fictional account of the dismantling and removal of the 86-floor Empire State Building. This book provides an excellent introduction to architectural structure, but may be too advanced for very young children. It is recommended for grades 6 and up.

Ken Buchanan's book, *Esta casa está hecha de lodo/This House is Made of Mud,* is a bilingual, beautifully illustrated, long free verse poem that tells the story of one family's house and its "neighbors." Recommended for grades 2-4.

Handout 21.1

WonderScience Construction Challenge

REACH FOR THE SKY!

In this activity, try to build the tallest possible paper cup skyscraper that can stand up to a terrible windstorm!

1. To build a skyscraper that is four cups tall, use a very thin layer of glue on the rims of the cups, or tape the cups together.
2. Let the glue dry for about 10 minutes. If you used tape, you can test your skyscraper immediately. Stand about 1 meter in front of your skyscraper, and wave your WonderScience magazine up and down to make a windstorm.
3. If your skyscraper is still standing, glue or tape some more cups onto it to make it even taller! Test your skyscraper again with the windstorm. How tall a skyscraper can you build that will not fall over in the windstorm?
4. Fill the bottom of your skyscraper with 40-50 pennies. Does this help it stand up through the windstorm? See how high you can build your skyscraper with this heavy base.

Hoja de trabajo 21.1

El reto de construcción de WonderScience

¿CÓMO SE CONSTRUYE UN RASCACIELOS?

En esta actividad usarás vasos de cartón para construir el rascacielos más alto posible que pueda resistir un ventarrón.

1. Para construir un rascacielos de cuatro vasos de altura, pon una capa delgada de pegamento en la orilla de cada vaso, o usa cinta adhesiva.
2. Deja secar el pegamento durante diez minutos. Si usaste cinta adhesiva, puedes probar la resistencia de tu rascacielos inmediatamente. Párate frente a tu rascacielos a un metro de distancia y mueve la revista de WonderScience para arriba y para abajo para crear un ventarrón.
3. Si tu rascacielos permanece parado, pégale más vasos para hacerlo más alto. Vuelve a probarlo con otro soplo de aire. ¿De qué altura puedes construir un rascacielos que resista un ventarrón?
4. Llena la base de tu rascacielos con 40-50 monedas de un centavo. ¿Ayuda esto a que el rascacielos resista el ventarrón? ¿Cúan alto puedes construir tu rascacielos con esta base?

Handout 21.2

WonderScience Construction Challenge

BEAM ME UP!

One of the first steps in building a house or other building is to construct a frame. The frame supports the building just like your skeleton supports your body. Most houses have wooden frames. Skyscrapers and tall office buildings usually have steel frames. The parts of the frame that go across the building are called beams. Beams help hold up the upper levels and roof of the building. Try this activity to find out how beams should be used to support the most weight without bending or breaking.

1. Hold one end of the meter stick so that the flat end side with the numbers is facing up. Ask a team member to hang the handles of the plastic bag about 10-15 centimeters from the other end of the stick.
2. Hold the stick tightly with both hands as a team member puts a few potatoes in the bag. Does the stick look like it is bending?
3. This time, turn the stick so that the side with the numbers faces sideways. Have a team member put the same potatoes into the bag, and see if the stick bends. Do it again. Why do you think the stick bends when positioned in one direction but not when positioned in the other?

If beams are shaped like your stick, how should the beams in the frame of a skyscraper be turned to support the most weight without bending or breaking?

Hoja de trabajo 21.2

El reto de construcción de WonderScience

¿PARA QUÉ SON LAS VÍGAS?

El primer paso para construir una casa o un edificio es hacer el armazón. El armazón da soporte al edificio, al igual que tu esqueleto sostiene a tu cuerpo. Muchas casas tienen armazones de madera. Los rascacielos y edificios altos casi siempre tienen armazones de acero. Las partes del armazón que atraviesan la construcción se llaman vígas. Las vígas ayudan a sostener los pisos de arriba y el techo. Haz esta prueba para aprender cómo usar las vígas para que sostengan el mayor peso posible sin quebrarse.

1. Detén una punta del metro por la parte plana, con los números hacia arriba. Pídele a un compañero que cuelgue la bolsa de plástico a unos 10-15 centímetros de la otra punta.
2. Detén firmemente el metro con las dos manos. Pídele a tu compañero que meta unas papas en la bolsa. ¿Parece estarse doblando el metro?
3. Ahora voltea el metro de manera que los números queden hacia un lado. Pídele a tu compañero/a que meta las mismas papas en la bolsa para ver si se dobla el metro. Mete más papas hasta que se empieze a doblar el metro. ¿Porqué crees que el metro se dobla cuando está en una posición pero no en la otra?

Si las vígas tienen la misma forma que tu metro, cómo se deben voltear las vigas del armazón de un rascacielos para soportar el mayor peso posible sin doblarse o quebrarse?

Handout 21.3

WonderScience Construction Challenge

THE MIGHTY DOME I

A dome is a structure that looks like an upside-down bowl. Some famous buildings with domes are the Astrodome, the Taj Mahal in India, and the United States Capitol building. Something about the shape of a dome makes it very strong, as you will see in the next activities.

1. Place paper towels on the table. Arrange your egg shell domes on the paper towel in a square. Place the cardboard square on top of the domes so that the edge of the cardboard sticks out about 3 centimeters past each dome.
2. Start placing magazines or thin books one by one on the cardboard. How many do you think you can stack before the domes will break. Keep stacking until you hear the domes cracking! Were the domes stronger than you thought they would be? How do you think the dome shape makes fragile material like egg shells so strong?

Hoja de trabajo 21.3

El reto de construcción de WonderScience

EL DOMO PODEROSO I

Un domo es una estructura que parece una vasija volteada al revés. Algunos edificios famosos con domos son el Astrodome, el Taj Mahal de la India y el Capitolio de los Estados Unidos. Como verás en las siguientes actividades, hay algo en la forma del domo que hace que sea una estructura muy fuerte.

1. Pon las toallas de papel en la mesa. Sobre ellas acomoda los cascarones de huevo en forma de cuadro. Coloca el cartón sobre los domos para que la orilla sobrepase cada cascarón por unos 3 centímetros.
2. Empieza a poner encima del cartón algunas revistas o libros delgados. ¿Cuántos libros crees que podrás colocar encima sin que se quiebren los cascarones? Sigue colocando más libros hasta que oigas que los cascarones se están rompiendo. ¿Cómo crees que la forma de un domo hace que un material tan frágil como las cáscaras de huevo sean tan fuertes?

Handout 21.4

WonderScience Construction Challenge

THE MIGHTY DOME II

1. Cover your work area with newspapers. Cut four holes in the bottom of a cardboard box. Blow up and tie the balloons and place them in the holes.
2. Mix the flour and water in a bowl, and stir until it is a smooth paste. Cut or tear each paper towel into four strips lengthwise.
3. Put both sides of a paper towel string in the paste, and pull the strip between your fingers, to make sure that the strip is completely coated on both sides.
4. Lay the strip across the balloon so that the center of the strip is over the top of the balloon. Cross four strips over each balloon so that the strips completely cover the top and sides of each balloon.
5. Use your hands to mold the pasted paper towels into smooth dome shapes. Find a sunny spot to put the box and let your domes dry for at least three days!
6. When your domes are completely dry, use a pencil or pen to carefully pop the balloons. Discard the balloons, and trim the bottom edges of the domes so that they sit evenly on a flat surface.

Let's see how strong these domes are! Place the domes on a piece of newspaper. Place a tray or cookie sheet upside down on the domes. Put a telephone book on the tray. If your domes didn't crack, add another telephone book. If your domes are still okay, add a 10 pound bag of potatoes. If your domes haven't cracked at all, take everything off them except the tray or cookie sheet. Take your shoes off and ask your partner to help you gently step up onto the middle of the tray to stand on your super-strong domes!

Hoja de trabajo 21.4

El reto de construcción de WonderScience

EL DOMO PODEROSO II

1. Antes de empezar, cubre con periódico tu área de trabajo. Pídele a tu compañero/a que haga cuatro agujeros en la parte de abajo de la caja y que infle y amarre los globos. Después, pídele que ponga los globos en los agujeros.
2. Mezcla el agua y la harina hasta formar una pasta suave. Corta o rompe cada toalla de papel a lo largo, en cuatro tiras.
3. Pon los dos lados de una tira de papel en la pasta y jálala entre los dedos para que los dos lados estén completamente cubiertos de pasta.
4. Pon la tira sobre el globo de manera que el centro de la tira quede sobre la parte de arriba del globo. Cruza cuatro tiras sobre cada globo, de modo que las tiras cubran completamente la parte de arriba y por los lados de cada globo.
5. Usando las manos, moldea las tiras de papel pegadas en forma de domos. Pon los domos a secar en un lugar soleado durante tres días.
6. Cuando los domos estén completamente secos, usando un lápiz o un bolígrafo explota los globos cuidadosamente. Desecha los globos y recorta la parte de abajo de los domos para que queden planos y así se puedan parar sobre una superficie plana.

¡Vamos a ver qué tan fuertes son estos domos! Colócalos sobre una hoja de periódico. Encima de ellos, coloca una charola o charolas de hornear. Pon un directorio telefónico en la charola. Si no se rompieron los domos, pon otro directorio. Si siguen sin romperse, agrega una bolsa de 10 libras de papas. Si todavía no se quiebran, quita todo menos la charola. Quítate los zapatos y pídele a tu compañero que te ayude a subir cuidadosamente sobre la charola. Trata de pararte encima de tu "domo poderoso".

Handout 21.5

Recording Our Results

Number of Potatoes	Yardstick with numbers facing up	Yardstick with numbers facing sideways
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Hoja de trabajo 21.5
Anotando nuestros resultados

Número de papas	Metro con números hacia arriba	Metro con números hacia el lado
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Lesson 22

The Power of the Sun
El poder del sol

Overview

In this activity, students discuss the ways people use natural resources as a source of energy in their homes. The idea of heating homes with solar energy is introduced. Each student builds a model house out of paper to find out how sunlight can be used to heat homes. This activity was extracted from, and is available in *Hot Water and Warm Homes from Sunlight* (please refer to reference section for more information).

Resumen

En esta lección, los alumnos discuten cómo la gente usa los recursos naturales como energía en sus hogares. Se presenta la idea de calentar el hogar con energía solar. Cada alumno construye una casa modelo de papel para investigar cómo se puede utilizar la luz del sol para calentar casas. Esta actividad está tomada de *Hot Water and Warm Homes from Sunlight*. (Vea la sección de referencias para más información).

Key Skills

Building models

Graphing

Listening and following directions

Charting

Destrezas claves

Construir modelos

Hacer gráficas

Escuchar y seguir instrucciones

Hacer cuadros/diagramas

Preplanning

1. Make one copy of the model house cut-out for each student. Use the heaviest paper available for duplicating the cutouts.

2. For each student, cut one rectangular window, 2" x 4 ¾" (5cm x 12cm) out of the plastic bags or clear acetate. Cutting several layers at once can make this go quickly.
3. Assemble all the items listed in the materials section.
4. Build one house yourself as a model. (Follow the instructions on pages 7-10.)
5. Review the following terminology:

   **solar energy* **energía solar*

Suggested Time

10 minutes--Welcoming
45 minutes—Homework/Learning Options
25 minutes—Guided Discussion
30 minutes— The Power of the Sun
10 minutes— Closing

2 hours total

Materials

The teacher, and one or two teaching assistants, are needed to fully implement this lesson. Materials needed include:

- Copy of the teacher's guide for *Hot Water and Warm Homes from Sunlight*, (pages 7 - 11).
- Tag board or poster board to make a class chart for student attendance.
- Ruler(s).
- Markers.

To build the model homes, you need the following materials for a class of 32:

- Ten plastic bags, 1 quart size (heavy duty ziplock type) or five pieces of clear acetate, 8 ½" x 11" (22 cm x 28 cm).
- 16 rolls of clear tape.
- White paper to cover windows.

For each student to build a model home:

- One Celsius thermometer for each student (see "Technical Notes" on page 45 of *Hot Water and Warm Homes From Sunlight* for more information).
- Copy of the "Model House" cut-out on page 11 for each child.
- One pair of scissors.
- One ruler.
- One roll of clear tape.

Suggestion...

Celsius thermometers can be expensive. As an option, assign each cooperative learning team to construct one house (rather than one house per student). Some teams will cover their windows, and other teams will not. Allow the class to compare the results of this experiment.

Suggested Quote/Cita sugerida

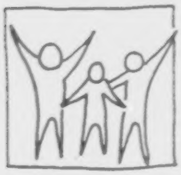
The realized man is a building that is never finished.

—Eugenio Maria de Hostos, in *Para todos los dias: Hostos, aforismos*

Mr. Hostos was a Puerto Rican thinker, educator, author, and abolitionist.

El hombre completo es un edificio que no se acaba nunca.

—Eugenio María de Hostos

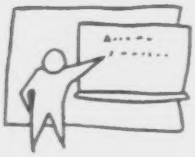


Welcoming (10 minutes)

Welcome students and take attendance. Some students should record daily attendance and weather.

Homework/Learning Options (45 minutes)

Students should use this time to complete homework, receive individualized tutoring or assistance, or engage in free reading.



Curriculum

Guided Discussion (25 minutes)

Introduce the subject of solar energy by following the instructions in *Hot Water and Warm Homes from Sunlight* on pages 8 and 9. (Another way to introduce the subject of solar energy would be to have a resource person from your community come and speak to the class about it. Organizations like "Habitat for Humanity" may be able to lead you to appropriate people in your area.) Review the following material for the discussion in Spanish.

Pregunte a los alumnos:

"¿Qué cosas en tu casa funcionan con energía? (Haga la lista en el pizarrón). ¿Puedes adivinar qué cosas usan más energía? (La calefacción, el calentador de agua). ¿De dónde viene ésta energía? (Gasolina, petróleo y carbón)".

Digale a los alumnos:

"Al quemar estos combustibles se contamina el aire. Esto es un problema en muchas partes del mundo y uno que también causa la lluvia ácida. Al quemar combustibles fósiles para crear energía se sueltan a la atmósfera grandes cantidades de bióxido de carbón. Muchos científicos creen que esto contribuye al calentamiento del planeta. Además, si seguimos usando los combustibles fósiles de la misma manera, pronto se acabarán. Los científicos están buscando otras maneras de producir energía".

"Ustedes van a hacer experimentos para averiguar cómo se puede usar la luz del sol para calentar nuestros hogares. ¿Qué hacen los arquitectos antes de construir las grandes casas solares? Sí, primero tienen que dibujar sus planos y luego hacer un modelo en pequeño. Ustedes van a hacer un modelo de una casa solar para hacer algunos experimentos".

"En sus experimentos de la casa solar, el *___resultado observado___ será la temperatura a la que llega la casa. ¿Qué diferencias hay entre las casas? (Forma, tamaño, color, número de ventanas o puertas, etc.) Para hacer un *___experimento controlado___ tendrán que enfocarse en una sola *___variable___—si hay ventanas o no. Esta será la *___variable experimental___".

Dígale a los estudiantes:

"Van a trabajar en sus grupos cooperativos. Cada alumno va a construir una casa con una ventana de plástico. La mitad de cada grupo va a dejar la ventana como está y la otra mitad la va a cubrir con papel".

Dígale que no tomen ni siquiera un paso de la construcción hasta que usted lo haya demostrado.

Before proceeding, make sure students understand that they are exploring ways in which the sun can be used as source of energy to heat up a house. In the next lesson they will be testing how their design can influence how hot their house can get.

The Power of the Sun (30 minutes)

Follow the instructions on Page 10 of *Hot Water and Warm Homes from Sunlight* to construct the model houses. To demonstrate to students what they are trying to achieve, show them the model you constructed. Students should work together in their cooperative learning groups. Make sure each group has adequate supplies and assign students in each group to fill the following roles: praiser, materials specialist, time-keeper, and reporter. If you have more than four students per group, appoint more than one praiser and materials specialist.

At the end of the half hour, have each group store their houses in a safe location. They will be used in the next activity, "The Solar House Experiment."

Closing (10 minutes)

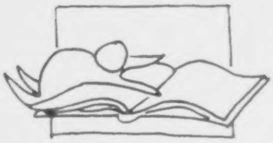
Have each group report on their progress in making the solar houses. Have students report on how well the group worked together, and praise each other's work.

Parent Link

This lesson provides a wonderful opportunity for students and parents to talk about the sun. Many cultures have myths about the sun's power, beauty, and its special abilities. In many others, it is also considered a deity. Some indigineous people of long ago would not even consider starting the morning and ending the day without prayers to the sun to thank it for rising, and asking that it rise again the next day. What stories about the sun from their own culture can parents share with children? This can also offer parents a fun opportunity to utilize the library as a resource. Myths about the sun in Africa, China or the Caribbean can be looked up and compared to those of a family's native culture.

Enlace familiar

Esta lección provee una oportunidad maravillosa para que los padres y estudiantes hablen acerca del sol. Muchas culturas tienen mitos acerca del poder del sol, su belleza y sus habilidades especiales. En algunas culturas lo consideran como un dios. Algunos indígenas de hace mucho tiempo atrás no podían ni siquiera considerar empezar la mañana y terminar el día sin hacer sus plegarias al sol para agradecerle su salida y pedirle que saliera nuevamente el próximo día. ¿Qué historias sobre el sol podrían compartir los padres con sus hijos de sus propias culturas? Esta actividad brinda a los padres la oportunidad divertida de utilizar la biblioteca como un recurso. Se pueden buscar mitos sobre el sol de otros lugares como Africa, China o el Caribe para compararlos con los mitos de la cultura nativa de la familia.

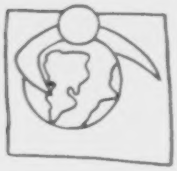


Literature Link

Available in Spanish, *La Danza de Yaxum*, written by Rossana Bohorquez, tells the beautiful tale of a young Mayan who loves the sun. Recommended for grades 3-6. Available from Hispanic Books Distributors.

Lesson 23

The Solar House Experiment
El experimento de la casa solar

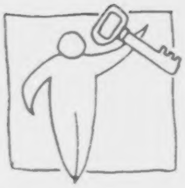


Overview

Students go outdoors to conduct a solar house experiment in small groups. House windows are covered and uncovered and results observed. Students record and graph the results. The activity follows the "Solar House Experiment" in *Hot Water and Warm Homes from Sunlight*. [Note: This activity can also be adapted to work indoors with the use of portable lamps.]

Resumen

Los alumnos, en grupos pequeños, salen afuera para hacer un experimento con una casa solar. Las ventanas se cubren y descubren y se observan los resultados. Los alumnos registran los resultados y hacen gráficas. La actividad sigue el "Experimento de la casa solar" en *Hot Water and Warm Homes from Sunlight*.



Key Skills

Experimenting
Observing
Recording
Measuring
Graphing
Writing

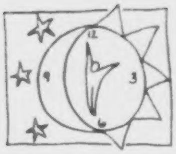
Destrezas claves

Experimentar
Observar
Registrar
Medir
Hacer gráficas
Redactar

Preplanning

1. Conduct the experiment yourself. Look for difficulties students may experience.
2. Duplicate a data sheet for each student.
3. Cut the 6" x 8" piece of cardboard (of the same thickness and color) from some cardboard cartons. Each student will place his or her house on a piece of cardboard to insulate the house from the ground. The house can be secured to the cardboard with a small piece of tape.
4. Prepare to serve as the group timer, calling out intervals of one minute, at which time your students read and record the temperatures of their houses. You could also have each group time their own experiment, if enough timing devices are available.
5. Select a suitable and sunny outdoor site, on level ground, for the experiment.
6. Review the following terminology:

* ***experimental variable***	* ***variable experimental***
* ***observed result***	* ***resultado observado***
* ***equilibrium***	* ***equilibrio***



Suggested Time

10 minutes—Welcoming
45 minutes—Homework/Learning Options
15 minutes—Guided Discussion
30 minutes—Solar House Experiment
10 minutes—Debriefing
10 minutes—Closing

2 hours total

Materials

The teacher and one or two teaching assistants are needed to fully implement this lesson. Materials needed include:

☆ Copy of the teacher's guide for *Hot Water and Warm Homes from Sunlight*, (pages 12 -16).

☆ A one-minute timer, or a watch with second hand.

☆ One roll of transparent tape for each cooperative learning group.

☆ One model house with thermometer for each student (constructed in Lesson 22).

☆ One piece of cardboard, 6" x 8" (16 cm x 20 cm) for each student, to be used as ground insulation for the house.

- One data sheet, "The Solar House Experiment," per student (master on page 16 of GEMS guide).
- A pencil for each student.

Suggested Quote/Cita Sugerida

The realized man is a building that is never finished.

— Eugenio María de Hostos, in *Para todos los días: Hostos, aforismos*

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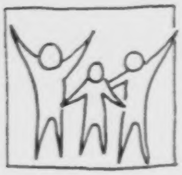
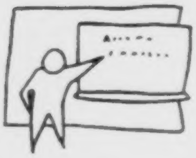


Welcoming (10 minutes)

Welcome students and take attendance. Some students should chart the day's attendance on the class attendance chart. Preview today's lesson.

Homework (45 minutes)

Students should use this time to complete any homework assignments, receive individual tutoring or assistance or engage in free reading.



Curriculum

Guided Discussion (15 minutes)

Use pages 12 - 16 in *Hot Water and Warm Homes from Sunlight* to instruct students on the purpose and methods of this experiment. Review the following material to conduct the experiment in Spanish.

Antes de hacer el experimento pregunte a los alumnos:

¿Qué cosas tienen en común todas las casas?

¿Cuáles son las variables constantes?

¿Cuál es la variable experimental? [La ventana cubierta o descubierta].

¿Cuál será nuestro resultado observado?

¿Cuál de las casas se calentará más?

Distribuya a los alumnos una copia del "Solar House Experiment Data Sheet", que aparece en la página de la guía de GEMS y explique a los estudiantes que deben anotar la temperatura al comenzar el experimento en el triángulo y una vez más cada minuto después del comienzo en el cuadrado designado. En el espacio indicado también deben apuntar la variable experimental (las ventanas) y la característica específica de sus casas (ventanas cubiertas o descubiertas).

Durante el experimento díga:

"Tomen la temperatura de la casa cada minuto durante cinco minutos y apunten a los resultados en la hoja de datos".

"Dejen las casas bajo la luz solar por otros cinco minutos". Durante este tiempo pida a los alumnos que completen sus gráficas en la hoja de datos. "Continuen anunciando cada minuto que pasa".

Usando el termómetro extra de la clase tome la temperatura del aire que está encima de la pieza de insulación del cartón. Esto les dará a los estudiantes una idea de la temperatura del aire que rodea sus casas.

Solar House Experiment (30 minutes)

Before proceeding with the Solar House Experiment, make sure students understand that they will be conducting an experiment to test whether the design of their house (with or without a window) makes a difference in how hot the house will get. Make sure to get student or team predictions of results.

Follow the instructions on Pages 14-15 of *Hot Water and Warm Homes from Sunlight*.

Debriefing (10 minutes)

Discuss with students the change in temperature readings throughout the experiment. Ask them what happened in the final readings of the temperature. Eventually the house temperatures will stabilize. What they have observed is a process called ***equilibrium*. Explain to them that equilibrium occurs when the rate of heat entering the house equals the rate of heat lost by the house. Equilibrium is a concept that applies to many scientific phenomena. Here are other examples:

1. If the air pressure inside a balloon equals the air pressure outside the balloon, the balloon stays the same size.
2. If the rate of water flowing into a bathtub equals the rate of water going down the drain, the depth of water in the tub remains constant.

Tell students that, in the next lesson, they will compare their results with those of others who have houses that are designed differently (windows versus no windows).

Al final del experimento diga a los alumnos:

"Observen el cambio de las lecturas de la temperatura durante el experimento. ¿Qué pasó con la última lectura de temperatura? Eventualmente, la temperatura de la casa se estabilizará. La condición que hemos observado se llama ***equilibrio*. Ocurre cuando la cantidad de calor que entra a la casa es igual a la cantidad de calor que se escapa. El equilibrio es un concepto que se puede aplicar a muchos fenómenos científicos. Por ejemplo:

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* **NOTE:** The example of immigration/emigration on Page 15 of the GEMS material does not account for natural increase — a phenomenon which contributes significantly to the growth of the Hispanic population in the U.S. Either explain natural increase as another variable which can upset equilibrium, or omit the example.

1. Si la presión de aire dentro de un globo es igual a la presión de aire fuera del globo, el tamaño del globo permanece igual.
2. Si la cantidad de agua que entra en la bañera es igual a la cantidad de agua que sale por el desaguadero, la profundidad del agua en la bañera permanece constante".

Closing (10 minutes)

Have students save their data sheets for the next activity session, "Discussing the Solar House Experiment." Have one or more students pretend to be parents asking children what they did at the Academia today, and have other children take the role of students responding. Help students develop a brief explanation of their experiments so they can tell their parents about what they learned.

Parent Link

Mind Stretcher. Try this exercise from Susan Milord's *Hands Around the World*. After students discuss with their parents what they've learned at Academia, have them collaborate on creating a one page story in response to the following question: If you didn't know what the sun was, how would you explain its light and warmth and movement across the sky? This is an exercise that requires imaginative thinking. Give both children and parents permission to be as playful and creative as they can. (Make sure to send the question home in writing.)

Enlace familiar

Reto mental. Pruebe este ejercicio del libro *Hands Around the World* de Susan Milord. Después que los estudiantes discutan con sus padres sobre lo que aprendieron en Academia, pídales que colaboren para crear un relato de una página respondiendo a la siguiente pregunta: ¿Si usted no supiera qué es el sol, cómo explicaría su luz, calor y movimiento alrededor del cielo? Este es un ejercicio que requiere imaginación. Permita a los padres y estudiantes ser lo más humorísticos y creativos posible. (Asegúrese de enviar la pregunta a casa en forma escrita).

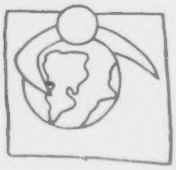
Literature Link

Tomie dePaola's *La leyenda del pincel indio* tells the story of a young boy who gives himself to art, how the colors of the late sun inspire his expression, and his obsession with matching the colors of its descent in the sky. Recommended for grades 2-5. [Available in English as *The Legend of the Indian Paintbrush*, released by the same publisher in 1988. Refer to "Recommended Readings."]

The chapter "Rulers, Priests and Gods" in Jacqueline Greene's *The Maya* talks about Hunab Ku, the supreme being and creator of the universe for the Maya, and how the sun and the moon were second only to him in their eyes. The Maya believed all people had descended from them. Recommended for grades 4-7.

Lesson 24

Discussing the Solar House Experiment
Conversamos sobre el experimento de la casa solar



Overview

Students discuss the results of their solar house experiments. The class summarizes the results and then draws conclusions. Students work in cooperative learning teams, write journals about the greenhouse effect, and construct a class temperature or weather chart.

Resumen

Los alumnos comentan los resultados de sus experimentos con las casas solares. En grupo hacen un resumen de los resultados y luego sacan conclusiones. Trabajan en equipos de aprendizaje cooperativo, escriben en sus diarios acerca del "efecto de invernadero" y hacen una gráfica de la temperatura o el tiempo.

Key Skills

Drawing conclusions

Calculating

Designing

Writing

Experimenting

Destrezas claves

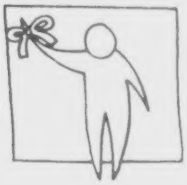
Sacar conclusiones

Calcular

Diseñar

Redactar

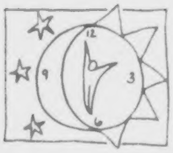
Experimentar



Preplanning

1. Review the explanation of the greenhouse effect in the "Behind the Scenes" section on page 44.
2. Duplicate a "Results and Conclusions" data sheet for each student.

3. Prepare an enlarged copy of the "Results and Conclusions Sheet" on the chalkboard, or on a large piece of butcher paper. Use this to record class results.
4. Review procedures for Work Station I. Determine which word game students will engage in, and prepare as necessary.
5. Place each groups' wordbank, word games, pencils, and blank word cards at Work Station I.
6. Assemble materials needed to conduct additional experiments at Work Station II.
7. Review recipe for *migajón* in Lesson 17, Work Station III, and assemble materials for the rest of the project.
8. Review your procedures and rules for work stations with the teaching assistants; assign teaching assistants to work stations, and make sure each one knows his/her responsibilities.



Suggested Time

5 minutes—Welcoming
45 minutes—Homework/Learning Options
15 minutes—Discussing Results
15 minutes—Work Station I: Wordbanks and Vocabulary Games
15 minutes—Work Station II: Going Further Experiments
15 minutes—Work Station III: *Nuestro mundo creativo*
10 minutes—Closing

2 hours total

Materials

A teacher and teaching assistants are needed to fully implement this lesson. In addition, the following materials are needed:

Work Station I:

- Chalk and chalkboard or marking pens and butcher paper.
- Teacher's guide of *Hot Water and Warm Homes from Sunlight*, page 21-22.
- For each student, a copy of the "Results and Conclusions" sheet for the "Solar House Experiment" (on page 23) in *Hot Water and Warm Homes from Sunlight*.
- Each student's data sheet from Lesson 23.

Work Station II:

- Key vocabulary introduced in the previous lessons, Handout 24.1.
- A pencil for each student.
- Each group's wordbank.

- Blank 3" x 5" cards for wordbanks.
- Paper and markers.

Work Station III:

- Materials for *migajón* recipe provided in Lesson 17, Work Station III.
- One hanger per group that will be working at this station.
- Two or three rolls of crêpe paper in an assortment of colors.
- Fish line.
- Very thin toothpicks, one per miniature that will be created.
- Small strips of wax paper that can be wrapped around toothpicks.
- Glue and tape.
- Gift-wrapping ribbon in an assortment of colors (optional).

Suggested Quote/Cita sugerida

The realized man is a building that is never finished.

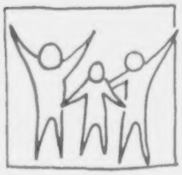
— Eugenio María de Hostos, in *Para todos los días: Hostos, aforismos*

Mr. Hostos was a Puerto Rican thinker, educator, author, and abolitionist.

El hombre completo es un edificio que no se acaba nunca.

— Eugenio María de Hostos

SESSION PLAN

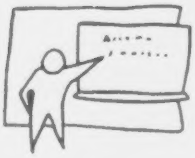


Welcoming (5 minutes)

Greet students and take attendance. Have one or two children graph today's attendance and weather on class charts. Preview the day's lesson.

Homework/Learning Options (45 minutes)

Students should use this time to complete homework assignments or engage in free reading. Make sure to take a few minutes to have some students share the stories they created with their parents in the previous Parent Link. Students without assignments can continue with their variations on the solar house experiment.



Curriculum

Discussing Results (15 minutes)

Follow the instructions on pages 20-21 of Hot Water and Warm Homes from Sunlight. If you're conducting this activity in Spanish, review the following "script."

Diga a los alumnos que para calcular el cambio de temperatura promedio deben restar la temperatura inicial de la temperatura final. Luego, pidales que apunten el resultado en sus hojas de registro. Después de que todos los grupos anoten los cambios de temperatura de sus casas, pida que calculen el promedio de los resultados de cada columna.

"Levanten la mano cuando crean que estoy señalando el promedio de los resultados que ustedes sacaron [el punto que mejor represente todas las marcas en la columna]. Cuando hayan calculado el promedio en las dos columnas, revisen los resultados de la clase. ¿Cómo afecta el hecho que las ventanas esten cubiertas a la temperatura de la casa modelo en comparación con las ventanas descubiertas?"

Suggestion...

If students constructed a team house rather than an individual house, make sure teams work together to find the net temperature change of their house. Use the enlarged copy of the "Results and Conclusions Sheet" to record class results and compare house designs with and without windows.

Before proceeding to the work station activities, reinforce what was learned through this activity—the design of the house can make a difference in how hot the house gets. Tell students that they will have an opportunity to experiment with other designs at Work station II.

Work Stations (15 minutes at each)

Work Station I: Wordbanks and Word Games

A teaching assistant should staff this station if possible. Teams will use their word-banks and their list of key vocabulary, Handout 24.1, as references. Give students working at this station time to review the words introduced in this lesson and to determine, as a group, which words should be added to their team wordbanks.

After students have reviewed this vocabulary, give them an opportunity to reinforce their new knowledge through some word games. Following are a few suggestions.

[*NOTE: Suggestions are taken from Spencer Kagan's Cooperative Learning.]

Option A: SEND-A-PROBLEM

1. Each student on the team makes up a review question and writes it down on a 3"x5" card. For younger students, the format might be standardized (true-false, missing word, multiple choice).
2. The author of each question asks it to his/her teammates. If there is total consensus, the author writes the answer on the back of the card. If not, the question is revised so that it produces consensus.

If time permits, at the end of the Academia, allow teams to pass their stack of review questions to another team. The team attempts to answer the question. If they have consensus, they turn the card over to see if they agreed with the sending team.

Option B: TURN-4-REVIEW

1. Teammates number off (one, two, etc.).
2. Students turn over a question card that has been prepared by the instructor beforehand. The card reads: "Team member 2, read question 3." Team member 2 reads question 3. Students then take a little time for everyone to think about the question, with no talking.
3. Students turn over an "Answer Card." The card dictates which student will answer the question: "Team member 4, Answer the question." Team member 4 attempts to answer Question 3.
4. Students turn over a Check Card. This card says which student should lead the group to consider the answer and determine if it is correct. "Team member 1, lead the team in checking."

After step 4, repeat steps 1-3.

Option C: TOSS-A-QUESTION

Students at Work Station I make a ball by wadding up a piece of paper, and then take turns tossing review questions. For example, each time the paper ball is tossed to a student, s/he answers a vocabulary question, and then the student tosses another question to someone else on the team.

Centro de trabajo 1: Bancos de palabras y juego de palabras

Si es posible, un asistente de maestro debe ser el/la que dirija éste centro de trabajo. El grupo usará su banco de palabras y la lista del vocabulario clave de la Hoja de trabajo 24.1 como referencia. Déle tiempo a los estudiantes que trabajen en éste centro para que repasen las palabras que presenta ésta lección y para determinar en grupo que palabras se deben añadir a su banco de palabras de grupo.

Después que los estudiantes hayan revisado éste vocabulario, déles la oportunidad de reforzar su nuevo conocimiento por medio del juego de palabras. Las siguientes son algunas sugerencias.

[***NOTA:** Las sugerencias fueron tomadas del Aprendizaje Cooperativo de Spencer Kagan].

Opción A: Mande un problema

1. Cada estudiante en el grupo se inventa una pregunta de revisión y lo anota en una tarjeta en blanco de 3x5 pulgadas. Para los estudiantes más pequeños, el formato debe estandarizarse (falso-verdadero, palabras que faltan, preguntas de selección multiple).
2. El autor de cada pregunta hace la pregunta a sus compañeros de grupo. Si todos están de acuerdo el autor escribe la respuesta detrás de la tarjeta. Si no hay acuerdo se revisa la pregunta para llegar a un acuerdo.

Si el tiempo permite, al terminar Academia, deje que los grupos intercambien sus preguntas de repaso con otros grupos. El grupo trata de responder a la pregunta. Si hay un acuerdo, ellos devuelven la ficha al grupo que escribió la pregunta y ven si están de acuerdo con la respuesta.

Opción B: Dale Vuelta al repaso

1. El compañero de grupo empieza a contar uno, dos, etc.
2. Los estudiantes entregan la tarjeta de preguntas que fue preparada por el maestro por anticipado. La tarjeta tiene la siguiente instrucción: "Integrante número 2 del grupo lee la pregunta 3". El integrante número 2 lee la pregunta 3. Los estudiantes toman unos minutos en silencio para que todos puedan pensar en la pregunta.

3. Los estudiantes entregan una "tarjeta de respuestas". La tarjeta determinará cúal estudiante va a responder a la pregunta: "El Integrante número 4 del grupo debe responder a la pregunta". El integrante número cuatro trata de responder a la pregunta 3.
4. Los estudiantes entregan una tarjeta de respuestas. Esta tarjeta determina qué estudiante debe dirigir el grupo y considerar si la respuesta esta correcta. "El integrante número 1 del grupo dirige al grupo en la corroboración de las respuestas".

Después de hacer el paso 4 repita los pasos del 1 al 3.

Opción C: Arroja una Pregunta

Los estudiantes en el centro de trabajo 1 hacen una bola envolviendo un pedazo de papel, luego toman turnos para "arrojar" preguntas de revisión. Por ejemplo, cada vez que la bola de papel se tira al estudiante, el o ella responde a una pregunta de vocabulario y luego el estudiante hace otra pregunta a otro compañero de grupo.

Work Station II: "Going Further" Experiments

A teaching assistant should staff this work station. Follow the instructions on pages 21-22 of *Hot Water and Warm Homes from Sunlight*, and have students conduct some additional experiments with their model solar houses, this time changing the experimental variables. For example, change the experimental variable of the direction the window faces, or the color of the interior floor of the house. Have students work in their cooperative learning groups to conduct these experiments.

Centro de trabajo 2: "Yendo más allá" con los experimentos

Un asistente de maestro debe ser el que dirije este centro de trabajo. Siga las intrucciones de las páginas 21 y 22 del manual de *Hot Water and Warm Homes from Sunlight* y diga a los estudiantes que conduzcan algunos experimentos adicionales con el modelo de su casa solar, esta vez cambiando la variable experimental. Por ejemplo, cambie la dirección de la variable experimental, o sea la dirección de la ventana o el color del interior del piso de la casa. Diga a los estudiantes que trabajen en sus grupos de aprendizaje para conducir estos experimentos.

Workstation III: *Nuestro mundo creativo*

The teacher and a teaching assistant will be needed to ensure the smooth management of the second half of the project at this work station.

Children of all ages, especially those in younger grades, love to create artistic and colorful representations of the sun. Using the *migajón* recipe provided in

Lesson 17, Work Station III (or, if you want to avoid baking and/or airdrying, another modeling material that is lightweight), have students create small representations of the sun. These can be painted in an assortment of bright colors. If you use *migajón*, and can extend this activity, you can have students, with the aid of a teaching assistant, gently insert thin toothpicks wrapped in tiny scraps of wax paper through the center of their miniatures while the mixture is still moist. When air dry, or after baking, remove toothpicks and wax paper from the miniatures.

Using hangers (one per group that will be working at this station), create a simple mobile. Have one student from the group wrap a long strip of the rolled crêpe paper that is used for parties around the hanger (or, a number of them twisted in different colors). Fish line can be used to hang the suns. Cut three or four strips of fish line to desired length (perhaps, 12-14 inches; strips can also vary in length). Mark 2-3 inches at the top of each piece of fish line that you will leave free for tying to the hanger later on. Insert the first sun miniature and slide it to the top of the first string of fish line. Tie enough knots at the bottom to hold it in place without sliding. Leave some slack and insert the next sun following the same procedure. (If the holes in the suns are large, you might want to tie knots at both the bottoms and the tops to keep the suns from leaning over.) When you get to the bottom of the first string, you can leave some slack to which a bright strip of crêpe paper can be glued or taped after it has been twisted. A long strip of ribbon (like those used to wrap presents) can also be used for the bottom. Proceed the same way with the rest of the pieces of fish line you've cut for the mobile. This is a great opportunity to have students assist with knot-making and, perhaps, talk about the different types of knots people use for different purposes.

Centro de trabajo 3: Nuestro mundo creativo

En este centro de trabajo se necesita al maestro y a un asistente para asegurarse de no tener contratiempo durante el desarrollo de la segunda mitad el proyecto. Los niños de todas edades, especialmente los que están en grados menores, les gusta crear representaciones artísticas y coloridas del sol. Usando la receta del migajón proveida en la Lección 17 los estudiantes crean una pequeña representación del sol en el centro de trabajo número 3 (o si desea saltar el paso de hornear o secar, se puede usar otro material liviano para modelar). Este se puede pintar con diferentes colores brillantes. Si usa migajón puede extender esta actividad con la ayuda de un asistente de maestro insertando suavemente los palillos de dientes delgados y envueltos con papel mantequilla en el centro de las miniaturas cuando aún esté húmedo. Cuando seque al aire libre o después de hornear, remueva los palillos de dientes y envolturas de papel de las miniaturas.

Usando colgadores (uno por grupo que trabaje en éste centro) cree un móvil. Diga a un estudiante del grupo que envuelva el colgador con papel crepé del que se usa para las fiestas (o varias tiras de diferentes colores envueltas juntas). El hilo para caña de pescar se puede usar para colgar los soles. Corte tres o cuatro tiras de hilo para caña de pescar del tamaño que desee (quizás de 12 a 14 pulgadas, o las tiras pueden variar en tamaño). Marque 2 o 3 pulgadas en las terminaciones del hilo que va a dejar para amarrar en los colgadores más adelante. Inserte el primer sol de miniatura en el hilo de la caña de pescar. Amarre nudos suficientes en la punta del hilo para que éste pueda sostener los soles y no se salgan fuera del hilo. Deje un poco de espacio e incerte otro sol. Siga el mismo procedimiento para el resto de los soles. (Si los agujeros de los soles son muy anchos debe hacer un nudo en ambas puntas para evitar que los soles se inclinen). Cuando llege a la punta del primer hilo puede dejar un espacio pequeño al cúal se puede pegar una pequeña tira de papel crepé envuelto. Una tira larga de cinta (como las que se usan para envolver regalos) se puede usar también en la punta que está mirando hacia abajo. Haga el mismo procedimiento con los otros hilos para la caña de pescar que cortó para hacer el móvil. Esta es una oportunidad para que los alumnos asistan con el atado de nudos y tal vez para hablar acerca de los diferentes tipos de nudos que la gente amarra para diferentes propósitos.

Closing (10 minutes)

Review the day's activities. Have students share and discuss what they have learned. To summarize student's findings explain the following:

The sun's energy comes to the earth in the form of heat and light. When the light passes through the air surrounding the earth, some of the light changes into heat. The heat is trapped on the earth's surface by the air above, so the earth is warm. This is the same as light passing through the glass walls of a greenhouse, changing to heat, and being trapped inside by the glass. This is why the warming of the earth is called the greenhouse effect.

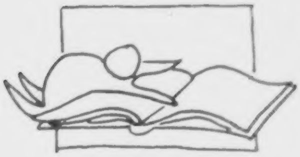
La energía del sol llega a la Tierra en forma de luz y de calor. Cuando la luz pasa por el aire que rodea la tierra, parte de esa luz se convierte en calor. El calor queda atrapado por el aire sobre la superficie de la Tierra y hace que en la Tierra se sienta calor. Esto es como un invernadero (una estructura de vidrio donde crecen las plantas tiernas) en donde la luz pasa por las paredes de vidrio y se convierte en el calor que queda atrapado por el vidrio. Por eso se le llama a este efecto, efecto del invernadero.

Parent Link

There is nothing more inspiring than families who not only learn together and grow together, but who play together as well. Susan Milord's "Play Shadow Tag" can involve both siblings and parents in two different kinds of tag games. Handout 24.2, which you can send home with students (you may need to modify the language a bit), is taken directly from Susan's book *Hands Around the World*. Take a few moments to review the exercise with students first so that, once home, they can be involved in motivating the family to join them.

Enlace familiar

No hay nada más alentador que las familias que no sólo aprenden y crecen juntas, pero que también juegan juntas. El juego de "quemado" o "mica" de Susan Milord involucra tanto a padres como a hijos en dos diferentes tipos de juegos de quemado. La Hoja de trabajo 24.2, la cúal puede enviarse a casa con los estudiantes (tal vez necesite modificar el lenguaje un poco), fue extraída directamente del libro *Hands Around The World* de Susan Milord. Tome un momento para revisar el ejercicio con los estudiantes primero para que así, una vez en casa, ellos puedan envolver y motivar a la familia a participar.



Literature Link

Larry White's *Energy: Simple Experiments for Young Scientists* offers a rich array of learning-by-doing projects and experiments using inexpensive materials (as in creating a "kitchen volcano"). Students learn about where energy comes from, its common forms, and how one kind becomes another, with a section on solar energy. An excellent resource for both classroom and home. Recommended for grades 3-5.

Handout 24.1

Unit Review of Vocabulary

1. hypothesis

2. valid

3. mass

4. strength

5. resistance

6. biased

7. solar energy

8. experimental variable

9. observed result

10. equilibrium

Hoja de trabajo 24.1

Repaso de vocabulario

1. hipótesis

2. válido

3. masa

4. fuerza

5. resistencia

6. parcial

7. energía solar

8. variable experimental

9. resultado observado

10. equilibrio

Handout 24.2
Susan Milord's "Play Shadow Tag"
Parent Link Family Fun

Shadow Tag

In sunny countries such as Saudi Arabia, children sometimes play a version of tag called "Shadow Tag." You're "out" once your shadow gets stepped on. When you become "it," you must count to three to give everyone a chance to get away from you.

Moon and Morning Stars

Some Spanish children play another version called "Moon and Morning Stars." This game is played near a large tree or building that casts a shadow. One player is chosen to be the Moon and that person must stay only in the tree's shadow (since the moon is visible in the dark sky). All the other players are Morning Stars. They run in and out of the shadow, taunting the Moon who tries to tag them. If the person who is Moon succeeds, the tagged Star becomes the next Moon.

The children who are Morning Stars chant this saying throughout the game:

The bright moon and the morning stars.
The bright moon and the morning stars.
Where the light shines gay,
We dance and play,
But who will dare the shadow?

Hoja de trabajo 24.2
"Juego de quemado con la sombra" de Susan Milord
Enlace familiar/Diversión para la familia

El juego de quemado con la sombra

En paises soleados como Arabia Saudita, los niños algunas veces juegan una versión diferente del juego de quemado que se llama el "juego de quemado con la sombra". Tú estás "fuera" cuando tu sombra es pisada. Cuando te conviertes en la persona que tiene que pisar la sombra, tú tienes que contar hasta tres para darle la oportunidad a todos de escaparse de tí.

Luna y estrellas de la mañana

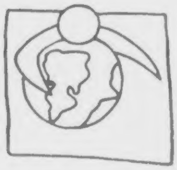
Algunos niños españoles juegan otra versión llamada "Luna y estrellas de la mañana". Este juego se realiza cerca de un árbol grande o un edificio que proyecte una sombra. Se escoge un jugador para que represente la luna y esa persona tiene que quedarse solamente en la sombra del árbol (ya que la luna es visible en el cielo obscuro). Todos los otros jugadores son las estrellas de la mañana. Ellos corren dentro y fuera de la sombra, burlándose de la luna que trata de agarrarlos. Si la persona que es la luna logra tocar a alguien, la estrella quemada se convierte en la próxima luna.

Los niños que representan las estrellas de la mañana cantan el siguiente refrán durante el juego:

La luna brillante y las estrellas de la mañana.
La luna brillante y las estrellas de la mañana.
Donde la luz brilla alegre
Nosotros bailamos y jugamos,
¿Pero quién va a desafiar a la sombra?

Lesson 25

The Solar Water Heater Experiment
El experimento del calentador de agua solar



Overview

In this lesson, students discuss conventional home water heaters and then conduct an experiment to heat water using aluminum pie pans and sunlight.

Resumen

En esta lección, los alumnos discuten los calentadores de agua convencionales y luego hacen un experimento de calentar agua utilizando recipientes de aluminio y la luz del sol.

Suggestion...

This experiment can be conducted indoors using portable lamps.

Sugerencia...

Este experimento se puede conducir adentro si se utiliza una lámpara portátil.

Key Skills

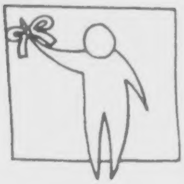
Experimenting
Describing
Recording
Graphing
Calculating
Measuring
Writing

Destrezas claves

Experimentar
Describir
Llevar registros
Hacer gráficas
Calcular

Medir

Redactar



Preplanning

1. Select an appropriate, sunny, outdoor site on level ground to conduct the activity, or
2. Set up an experiment table with portable lamps.
3. There will be a 15- to 20-minute wait from the time students have their experiments all set up to the time they begin to record results. Plan ahead for this time. One option is to carry out a discussion of the conclusions of the house heating experiments. Or you can discuss some types of solar water heaters the students may be familiar with from their own neighborhood or homes.
4. Review the following terminology:

* *water heater*	* *calentador de agua*
* *insulator*	* *aislador*
* *conclusion*	* *conclusión*
* *calculate*	* *calcular*
* *measurement*	* *medida*

Materials

A teacher and, at least, one teaching assistant are needed to comfortably implement this lesson. In addition, you will need:

☆ A copy of the Teacher's Guide for Hot Water and Warm Homes from Sunlight, pages 27-33.

☆ One data sheet for each student (master included, page 30).

☆ Class charts for opening activities.

For a class of 32:

☆ 16 clear plastic bags (standard size for produce) with twist ties.

☆ 1½ gallons of water (6-8 liters) in two buckets or basins.

(**Note:** The temperature of the water should be the same as, or less than, the outdoor air temperature, but not warmer).

For each cooperative learning team:

☆ One paper cup.

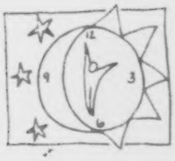
☆ One aluminum pie pan.

☆ One piece of cardboard 6" x 8" (16 cm x 20 cm).

- ☆ One thermometer (Celsius).
- ☆ One pencil.

Optional:

- ☆ One manila file folder or clipboard for outside recording.
- ☆ 2-3 portable lamps.



Suggested Time

10 minutes—Welcoming
45 minutes—Homework/Learning Options
45 minutes—Solar Water Heater Experiment
5 minutes—Clean-up
15 minutes—Journal and Closing

2 hours total

Suggested Quote/Cita sugerida

The realized man is a building that is never finished.

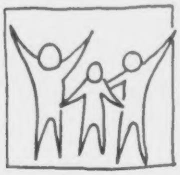
—Eugenio Maria de Hostos, in *Para todos los dias: Hostos, aforismos*

Mr. Hostos was a Puerto Rican thinker, educator, author, and abolitionist.

El hombre completo es un edificio que no se acaba nunca.

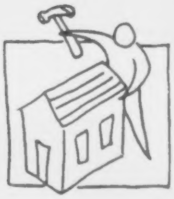
—Eugenio María de Hostos

SESSION PLAN



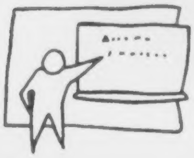
Welcoming (10 minutes)

Welcome students and take attendance. Assign students to the various tasks of graphing today's attendance, and charting today's temperature, or weather, on the class charts. Preview the day's lesson and expectations you may have about how students will behave as they conduct the experiment outdoors.



Homework/Learning Options (45 minutes)

Students should use this time for free reading or completing homework assignments.



Curriculum

Solar Water Heater Experiment (45 minutes)

Follow the instructions in *Hot Water and Warm Homes from Sunlight*, pages 34-35. While the discussion and background portion of the lesson begins inside, your teaching assistant will be moving outside to the spot you've selected to conduct the experiment. If you're conducting the activity in Spanish, review the following information:

Pregunte a los alumnos:

"¿Además de la calefacción, qué otra cosa gasta (usa) energía en la casa ? [El calentador de agua]. ¿Para qué usan el agua caliente en la casa? ¿Cómo se calienta el agua? [Otra vez, quemando combustibles, ya sea directamente — como en un calentador de gas—o indirectamente—durante el proceso de hacer electricidad para calentar el agua]. Acuérdense que los recursos de combustibles están disminuyendo, así que estamos buscando otras maneras de calentar agua. Hoy vamos a hacer un experimento usando recipientes de aluminio como modelo para calentar el agua. Queremos investigar de qué manera se calienta más el agua: con recipientes tapados o destapados. ¿Cómo podemos diseñar nuestro ***experimento controlado**?"

Una vez que estén afuera, antes de empezar el experimento, dígales:

"En el triángulo, anoten la temperatura al comenzar y en el cuadrado la temperatura al terminar. En la hoja de datos, llenen el espacio para la variable experimental [tapas] y apunten las características específicas de sus recipientes de agua [tapados o destapados]".

Después de repartir todos los materiales a los alumnos, dígales:

"Echen una taza llena de agua (cinco onzas) en sus recipientes de aluminio. Tomen la temperatura del agua sumergiendo el termómetro en el agua y dejándolo por unos 30 segundos. Ahora, lean y anoten la temperatura inicial del agua. Toquen con sus dedos la temperatura del agua. Si están usando las tapas, entonces deben cerrar sus bolsas".

Después de 15-20 minutos, dígales:

"Anoten la temperatura final en sus hojas de datos. Ahora, vuelvan a tocar el agua con los dedos y comparen lo que sienten esta vez con lo que sintieron la primera vez".

Cleanup (5 minutes)

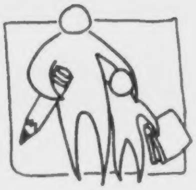
Have students pour water out on plants or the lawn, collect materials and return these to the classroom. All materials, including the paper cups, can be re-used. Data sheets should be saved for the next activity.

Journal and Closing (15 minutes)

Briefly review the day's activity and ask students to spend a few minutes responding in their journals to what they learned at Academia today. They may do so in the form of a paragraph, song, poem, story, etc. The important thing is that they are able to synthesize their experience through writing.

Al terminar:

Repase brevemente la actividad de hoy. Pídale a los estudiantes que tomen unos minutos para responder a lo que aprendieron hoy en la Academia en sus diarios. Pueden hacerlo en forma de párrafo, canción, poema, relato, etc. Lo importante es que puedan sintetizar su experiencia por medio de la palabra escrita.



Parent Link

Have students work with their parents in creating a "prayer" to the sun. Handle this with care to make sure that no one's religious or spiritual views are in any way offended. Keep it simple and make it manageable. Give some general guidelines; for example, that it be 5-6 lines long. A writing prompt may also be helpful (e.g., "Everyday you rise and..." or "I thank you for..."). Tell them that, through this prayer, we will all express our gratitude for something we normally take for granted.

Enlace familiar

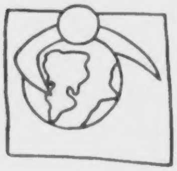
Pida a los estudiantes trabajar junto a sus padres para crear una "plegaria" al sol. Maneje esto con mucho cuidado y asegúrese de no ofender de ninguna manera la religión o los puntos de vista espirituales de los alumnos. Manténgalo simple y hágalo fácil de manejar. Déles algunas pautas generales; por ejemplo, puede ser de cinco a seis líneas. Un ejemplo escrito también podría ser muy útil (por ejemplo, "todos los dias sales y..." o "Yo te doy gracias por..."). Dígales que por medio de esta plegaria, todos expresaremos nuestro agradecimiento por algo que normalmente tomamos por sentado.

Literature Link

John Bierhorst's *The Woman Who Fell From the Sky* retells an Iroquois story of creation where we not only learn about the birth of the sun, but the rest of the universe as well, and how Sky Woman's twins, "Sappling" and "Flint" live inside us all. Recommended for grades 2-5.

Lesson 26

Discussing the Solar Water Heater Experiment
Conversamos sobre el experimento del calentador de agua solar

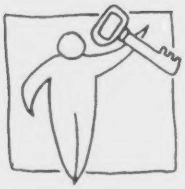


Overview

In this activity, students calculate the net temperature change of their own solar water heater experiment, share the results with the other members of their groups, and then discuss the results with the class.

Resumen

En ésta lección, los alumnos calculan el cambio neto de temperatura de su experimento con el calentador de agua solar, comparten los resultados con los demás miembros de su equipo y luego discuten los resultados con todo el grupo.



Key Skills

Calculating

Sharing information

Charting

Analyzing information

Destrezas claves

Calcular

Compartir información

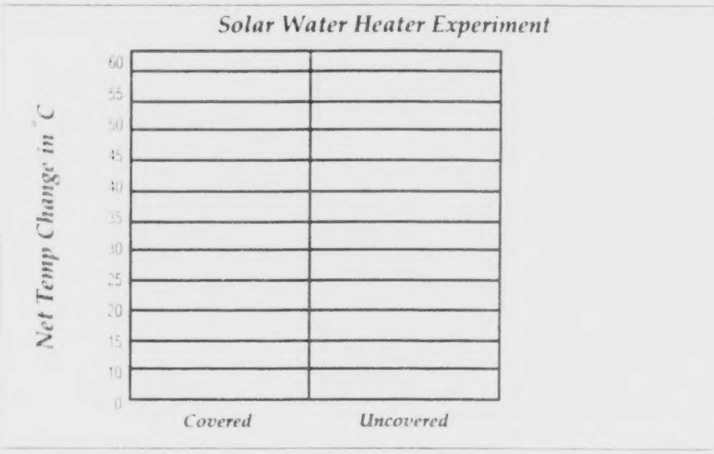
Hacer gráficas

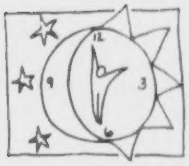
Analizar información

Preplanning

1. Prepare a large chart on the chalkboard or on butcher paper to display the class results. See Figure 1 below.
2. Prepare the materials to conduct the experiment again, this time with half the teams using smaller pie plates.

Figure 1

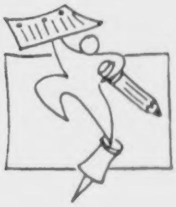




Suggested Time

10 minutes—Welcoming
45 minutes—Homework/Learning Options
20 minutes—Discussing Experiment Results
30 minutes—Changing the Experimental Variable
5 minutes—Debriefing
10 minutes—Closing

2 hours total



Materials

A teacher and at least one teaching assistant are needed to most comfortably carry out this lesson. In addition, you will need:

- A copy of the teacher's guide for *Hot Water and Warm Homes from Sunlight*, pages 33-43.
- Chalk and chalkboard or marking pens and butcher paper.
- Each student's data sheet, "The Solar Water Heater Experiment" from Lesson 25.
- One data sheet for each student (master on page 31).
- Class charts and graphs for "Welcoming" activities.
- Materials used for conducting the solar water heater experiment, and small pie pans.
- (4" diameter) for half the teams.

Suggested Quote/Cita sugerida

The realized man is a building that is never finished.

—Eugenio María de Hostos, in *Para todos los días: Hostos, aforismos*

Mr. Hostos was a Puerto Rican thinker, educator, author, and abolitionist.

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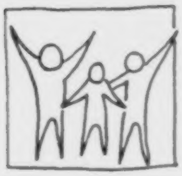
SESSION PLAN

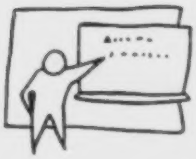


Welcoming (10 minutes)

Welcome students and take attendance. Choose students to chart today's attendance and temperature or weather. Briefly review the findings, or patterns to date of your class experiments and charts. Preview the day's lesson.

Homework/Learning Options (45 minutes)

Students should use this time to complete homework assignments or engage in free reading. Allocate sometime for a few students to share the "sun prayers" they wrote at home with their parents.



Curriculum

Discussing Experiment Results (20 minutes)

Follow the instructions on pages 39-41 of *Hot Water and Warm Homes from Sunlight* to discuss results of the solar water heater experiment. If you are conducting the discussion in Spanish, review the following "script":

Pregunte a los alumnos:

"¿Qué tipo de calentador de agua solar calentó el agua más rápido? ¿Qué nos dice este experimento sobre cómo hacer un calentador de agua más eficiente?" [Es importante usar una tapa para este tipo de calentador].

Changing the Experimental Variable (30 minutes)

Follow the instructions on page 34 to change the size of the pie pans, and conduct the experiment again.

Debriefing (5 minutes)

Discuss the results with students and ask them to draw ***conclusions** about what they observed. [The larger dish has more surface area to collect more sunlight and will probably get hotter in a 15-minute period.]

Closing (10 minutes)

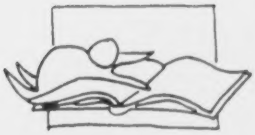
Review the day's activities. Help students come up with explanations of what they've been learning about ***solar energy** and problem-solving.

Parent Link

The Sun: Braintwister. Copy onto color paper the diagram that appears as Handout 26.1 in this lesson for students to take home. This is a language arts activity that allows students to brainstorm nouns, adjectives and verbs that have to do with the sun and what they've learned about solar energy. Explain that, with the help of their parents, they are to come up with words that have to do with the sun and solar energy for each corresponding blank. In the case of most of the adjectives, students are asked to stretch their minds and make sure these correspond with one of the senses that is indicated.

Enlace familiar

El sol: Trabamente. Copie en un papel de color el diagrama que aparece como Hoja de trabajo 26.1 en esta lección para que los estudiantes puedan llevarselo a casa. Esta es una actividad de lenguaje que permite a los estudiantes repasar los sustantivos/nombres, adjetivos y verbos que tienen algo que ver con el sol y lo que aprendieron acerca de la energía solar. Explique que con la ayuda de sus padres pueden encontrar palabras que tengan que ver con el sol y la energía solar para llenar cada uno de los espacios blancos correspondientes. En el caso de la mayor parte de los adjetivos, los estudiantes pueden ampliar sus conocimientos y asegurarse de que estos correspondan con uno de los sentidos que se indica.

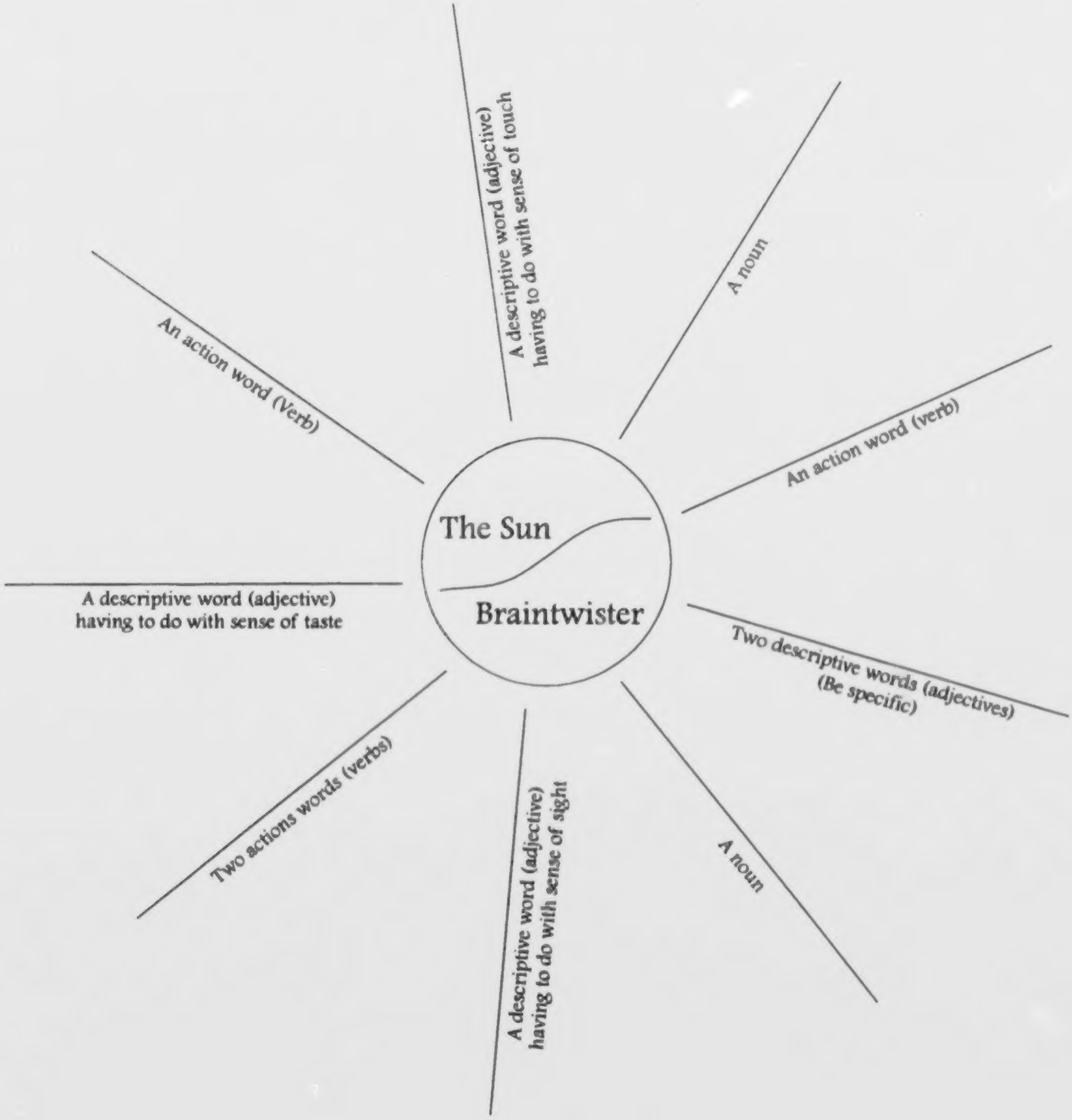


Literature Link

The sun often makes us think of growth, food, and farming. In Tony Johnston's and Tomie dePaola's book, *The Tale of Rabbit and Coyote,* we meet a farmer who grows "chiles," a rabbit who steals them, and a coyote who is tricked by him. The story employs Spanish humorously throughout the text as well as in the very colorful illustrations. (A glossary for the Spanish is provided in the back of the book). Recommended for grades 2-4.

Handout 26.1

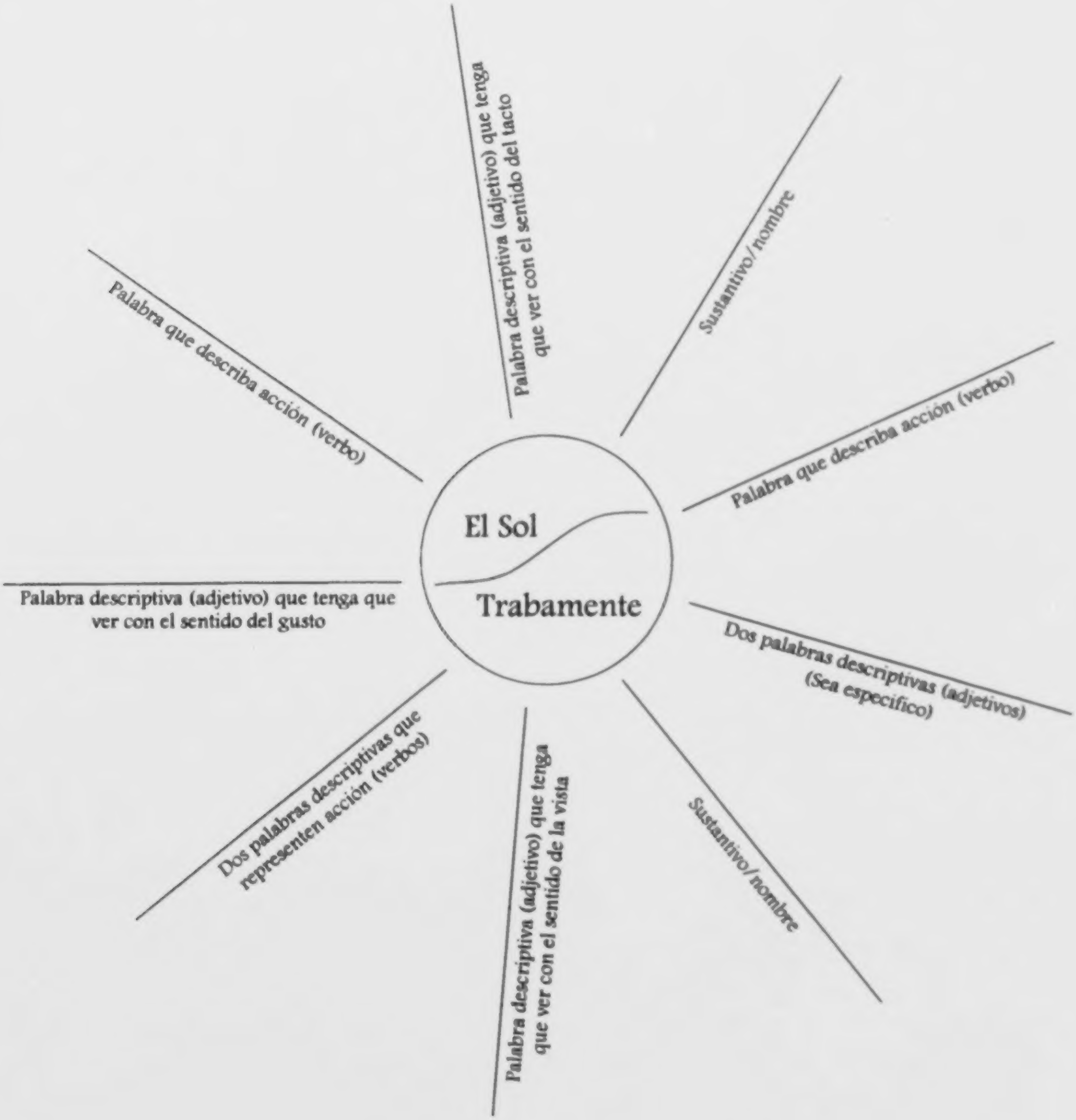
The Sun: Braintwister


A descriptive word (adjective) having to do with sense of touch
A noun
An action word (Verb)
An action word (verb)
The Sun
Braintwister
A descriptive word (adjective) having to do with sense of taste
Two descriptive words (adjectives) (Be specific)
Two actions words (verbs)
A descriptive word (adjective) having to do with sense of sight
A noun

Name____

Hoja de trabajo 26.1

El Sol: Trabamente


El Sol
Trabamente
Palabra descriptiva (adjetivo) que tenga que ver con el sentido del tacto
Sustantivo/nombre
Palabra que describa acción (verbo)
Palabra que describa acción (verbo)
Palabra descriptiva (adjetivo) que tenga que ver con el sentido del gusto
Dos palabras descriptivas (adjetivos) (Sea especifico)
Dos palabras descriptivas que representen acción (verbos)
Palabra descriptiva (adjetivo) que tenga que ver con el sentido de la vista
Sustantivo/nombre

Nombre____

Lesson 27

What Have We Learned?
¿Qué hemos aprendido?

Overview

This lesson helps students summarize what they have learned in the last nine lessons. Students have had considerable practice making predictions, conducting experiments, and charting results. They apply what they have learned by writing a group story/letter and designing a class chart.

Resumen

Esta lección ayuda a los alumnos a resumir lo que han aprendido en las últimas nueve lecciones. Han tenido bastante práctica en hacer predicciones, hacer experimentos y convertirlos en gráficas. Aplican lo que han aprendido al redactar un relato/carta de grupo y diseñar una gráfica de la clase.

Key Skills

Learning and applying new vocabulary

Reading charts and graphs

Interpreting charts and graphs

Analyzing charts and graphs

Writing and revising

Destrezas claves

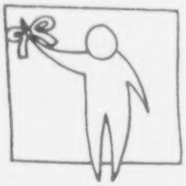
Aprender y aplicar vocabulario nuevo

Leer cuadros y gráficas

Interpretar cuadros y gráficas

Analizar cuadros y gráficas

Redactar y editar



Preplanning

1. Prepare materials and supplies needed to design charts.
2. Review the charts and graphs students have been making. Prepare questions that call attention to patterns or special features in the data.

3. Identify a sister site that students can write to for the "Writing and Revising: Across Sites" part of this lesson. (If you are not personally familiar with another site, call the Center for Community Educational Excellence of the National Council of La Raza for a directory of affiliates.) Make sure that you coordinate this exchange with a fellow teacher as far in advance as possible, and that students will be able to obtain a response from their sister site.

Suggested Time

5 minutes — Welcoming
45 minutes — Homework/Learning Options
30 minutes — Interpreting Data
30 minutes — Writing and Revising Across Sites
10 minutes — Closing

2 hours total

Materials

A teacher can implement this lesson alone if need be. (Teaching assistants to help with vocabulary games will make the lesson go more smoothly.) In addition, you will need the following materials:

- The charts and graphs the children have been making of attendance and the weather.
- A calculator.
- Chalkboard and chalk or chart paper and markers.
- Pencils and paper.

Suggested Quote/Cita sugerida

The realized man is a building that is never finished.

— Eugenio María de Hostos, in *Para todos los días: Hostos, aforismos*

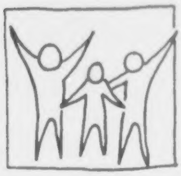
Mr. Hostos was a Puerto Rican thinker, educator, author, and abolitionist.

El hombre completo es un edificio que no se acaba nunca.

— Eugenio María de Hostos

330

SESSION PLAN

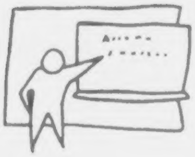


Welcoming (5 minutes)

Welcome students and take attendance. Assign students to chart today's attendance and weather. Preview the day's activities, and have students sit with their cooperative learning groups. See if students can come up with one or two sentences that summarize the data on each of the charts.

Homework/Learning Options (45 minutes)

Students should use this time to complete homework assignments or engage in free reading. Make sure to save some time to collect "The Sun: Braintwister" diagrams families were asked to do in the previous lesson's Parent Link. Have a few students share theirs, and post everyone's around the room.



Curriculum

Interpreting Data (30 minutes)

Call students' attention to the attendance and weather charts they have been creating. Explain to them that today they will be interpreting the data they have been graphing, and find new ways of displaying the data.

Ask students:

"What can you tell me about attendance at Academia? Which days or weeks had the best attendance? Can you see any patterns in the data? Is there any relationship between the attendance chart and the weather chart? Did the attendance drop on particularly cold or rainy days? How can we figure out the average attendance for Academia?" [Using the calculator, add the attendance for each day and divide that number by the number of days.]

Pregunte a los alumnos:

"¿Qué pueden decirme sobre la asistencia a la Academia? ¿En qué día o semana hubo mayor asistencia? ¿Hay alguna relación entre el clima y la asistencia? ¿Bajó la asistencia durante los días frios o lluviosos? ¿Cómo podemos calcular el promedio de asistencia a la Academia?" [Usando una calculadora, sume la asistencia de cada día y divida ese número entre el número total de días].

Have students work in their cooperative learning groups. See if they can create a different chart using the information available on the existing charts.

(For example, instead of a daily attendance chart, a monthly attendance chart; graph attendance versus weather; chart average attendance by month by correcting data points, etc. Can they see any patterns like increase or decrease in attendance over a particular period?)

Suggestion...
For younger children, it will be necessary to review how to read the charts. You may decide to provide younger students with an assignment in which they need to consult the graph. For example, "How many students attended Academia in November?"

Writing and Revising Across Sites (30 minutes)

For this part of the lesson, students will begin to write a group story to a sister site, in the form of a letter, where they first introduce themselves and their own Academia site. Ask them to share their experiences and point out things they have learned during Unit 3. They should share information and some of the results of their experiments and charts, talk about what they learned from the solar house and solar water heater experiments, and their work in designing houses for the puffy pigs. Have students share some samples of the language arts activities they did as part of the unit, and talk about projects they created in the *Nuestro mundo creativo* work stations. Perhaps it may be possible for you to photograph one or two of these projects to send pictures along with this group writing. Students might be curious about the way houses are constructed in the community where the sister site they are writing to is located, and what weather conditions are like there. Encourage them to ask questions and/or look up information. They might also want to talk about the houses and weather in their own community. Make sure that you take advantage of this opportunity to have students practice revising skills. Working on a computer, where they can easily make editorial changes, is recommended for this project.

Work together to draft the story, using the language experience approach. If you are uncertain as to how to use this method, review the appropriate section of the *Academia del Pueblo Implementation Manual*. First, discuss the ideas as a group and recall what students have been doing and learning. Then, students can offer sentences which are written down by the teacher. Don't try to edit or suggest much at this point — just write the sentences down. Spell and punctuate correctly, but don't clean up grammar at this stage.

Read the completed letter or story aloud. Ask students to read it again with you. Now, see if you can find ways to make the story better. Are all the sentences grammatically correct? Can the sentences be placed in a clearer order? Is some additional information needed? Can you organize the sentences into paragraphs? Do you need a conclusion?

Revise the story together. If you run out of time to revise, perhaps students without homework or those who finish early can work on this task so that a final story can be presented to the class by closing.

Escribiendo y revisando a lo largo de los centros

Para ésta parte de la lección, los estudiantes empezarán a escribir un relato de grupo en forma de carta para otro centro comunitario, donde ellos primero se presentarán y luego presentarán a su propia Academia. Pida que compartan sus experiencias y mencionen las cosas que aprendieron en la Unidad 3. Deben compartir información y algunos resultados de sus experimentos y cuadros, hablar acerca de lo que aprendieron en el experimento de la casa solar, el experimento del calentador de agua solar y el trabajo que hicieron para diseñar las casas de los cochinitos. Pida a los estudiantes que compartan algunos ejemplos de actividades de lenguaje que hicieron como parte de la unidad y acerca de los proyectos que ellos hicieron en los centros de trabajo de "Nuestro mundo creativo". Si es posible, fotografíe uno o dos de estos proyectos para mandar fotos junto a la carta del grupo. Los estudiantes posiblemente tendrán la curiosidad de saber cómo se construyen las casas en la comunidad donde está localizado el centro al que le están escribiendo la carta y cómo son las condiciones del clima en ese lugar. Incentívelos para que hagan preguntas o para que busquen información. Tal vez les gustaría hablar acerca de las casas y el clima de su propia comunidad. Asegúrese de tomar ventaja de esta oportunidad para que los esudiantes puedan practicar sus destrezas de revisión. Para este proyecto se recomienda el uso de una computadora para que así puedan editar y hacer cambios con mayor facilidad.

Trabaje junto a los estudiantes para crear un borrador del relato usando la técnica de "Language Experience Approach". Si usted no se siente seguro/a de cómo usar este método, revise la sección apropiada en el *Manual de Implementación de la Academia del Pueblo*. Primero discuta las ideas en grupo y repase lo que los estudiantes han aprendido y están haciendo. Luego los estudiantes puden ofrecer oraciones para que el maestro las escriba. No trate de editar ni sugerir mucho en este punto — solamente escriba las oraciones. Revise la ortografía y la puntuación, pero todavía no revise la gramática.

Lea la carta o relato en voz alta. Pida a los estudiantes que lo lean nuevamente. Ahora vea si puede encontrar alguna forma de el relato. ¿Están todas las oraciones gramáticamente correctas? ¿Pueden organizarse las oraciones de una manera más clara? ¿Es necesario tener información adicional? ¿Pueden organizase las oraciones en forma de párrafos? ¿Se necesita tener una conclusión?

Revisen el relato juntos. Si no tiene el tiempo necesario para poder revisarlo, tal vez los estudiantes que no tienen tarea para la casa o que ya terminaron antes

pueden hacer esta tarea para que así se pueda presentar la versión final del relato al terminar la clase.

Closing (10 minutes)

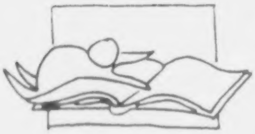
Review the revised story with the class, making sure to point out some important concepts and ideas they learned and shared throughout the unit. Tell students that, in the next unit, they will be studying the relationship between human activities and wildlife.

Parent Link

Making Fruit Leather. This family activity (taken directly from Susan Milord's *Hands Around the World*) is bound to be a winner. Directions appear as Handout 27.1. Again, make sure you review the activity with students at Academia before sending it home to the family. [This activity could be adapted to take place at Academia if you limit it to one fruit leather box per cooperative group, have access to a kitchen nearby, and could have someone in charge of bringing in the boxes at night and/or in case of inclement weather.] This activity should be done in its entirety only by older students, especially because it requires the use of both a stove and a blender. Please make sure that you remind families to closely guide students.

Enlace familiar

Como hacer cuero de fruta. Esta actividad familiar (sacada directamente del libro de *Hands Around the World* de Susan Milord) seguramente les va a gustar. Las instrucciones aparecen en la Hoja de trabajo 27.1. Asegúrese de revisar la actividad con los estudiantes en Academia antes de enviarlo a la casa para la familia. [Esta actividad podría ser adaptada para hacerla en Academia si usted la limita a una caja de cuero de fruta por cada grupo cooperativo, tiene acceso a una cocina cercana y tiene a alguien encargado de meter las cajas por las noches y cuando haya mal tiempo]. Esta actividad puede hacerse en su totalidad solamente con niños un poco mayores especialmente porque ésta requiere el uso de una cocina y una licuadora. Por favor asegúrese de recordarle a las familias que vigilen constantemente a los estudiantes para guiarlos.



Literature Link

A House is a House for Me, by Mary Ann Hoberman, lists, in rhyme, the dwellings of various animals and people. This book provides for a great literature link in that it reinforces the similarities between people and animals. Recommended for grades pre-kindergarten to 3.

Handout 27.1

Susan Milord's "Making Fruit Leather"

The sun is used to dry foods to preserve them in many countries. This is true where refrigeration is uncommon, as in Ethiopia where seasoned sun-dried meat called biltong is eaten. Other foods are dried to change their character. In India, for instance, green peppercorns are dried on woven mats in the sun for seven to ten days before turning hard and the more familiar black color.

Children are often asked to help stir the spices and other foods spread out in the sun to speed the drying. Would you like to try your hand at drying some food? Make a batch of fruit leather to see how it's done. Follow the instructions below:

Fruit leather makes a naturally sweetened snack packed with energy! It is best made with very ripe fruit. You can use thawed frozen fruit out of season, or wait until there are ripe berries, peaches, or apricots in your garden or at the market.

Peel and pit a pound of fruit. Cut into small pieces and puree in a blender or food processor to make a smooth mush.

Cook the pureed fruit in a pan over low heat until it boils (have an adult help you at the stove). If the fruit sticks to the pan, add a little fruit juice or water.

Remove the pan from the stove and let cool. Meanwhile, wrap two or three plates in plastic wrap. Spread the puree on the plates, and place them in a shallow box. Cover with cheesecloth.

Place the box in the sun. It will take one to three days for the fruit to turn to "leather." Bring the box in each night, or if there are signs of rain. The leather is ready to eat when it can be pulled away from the plastic. Enjoy!

Handout 27.1

"Cómo hacer cuero de fruta" de Susan Milord

En muchos países se usa el sol para secar y preservar ciertos alimentos. Esto pasa en los lugares donde no son comunes los sistemas de refrigeración, como en Etiopía donde se come carne condimentada y secada por el sol llamada biltong. Se secan otras comidas para cambiar sus características. En la India, por ejemplo, los granos de pimienta se secan en el sol en unos tapetes tejidos durante siete o diez días antes de que se vuelvan duros y se pongan negros, el color más común de la pimienta.

Los niños frecuentemente ayudan a mover los condimentos y extender otras comidas en el sol para acelerar el secado. ¿Te gustaría hacer una actividad para secar algunas comidas? Para hacer una porción de cuero de fruta y ver como se hace, sigue estas instruciones:

El cuero de fruta es un alimento natural, dulce y lleno de energía. Se obtiene mejor resultado si se usa fruta madura. Se puede usar fruta descongelada que está fuera de temporada o esperar hasta que haya cerezas maduras, duraznos o albaricoques maduros en tu jardín o el mercado.

Pela y saca las pepas (semillas) de una libra o (medio kilo) de fruta. Corta en pedazos pequeños y haz un puré suave en una licuadora o procesador de comidas.

Cocina el puré de fruta en una cacerola a fuego lento hasta que hierva (pida a un adulto que lo ayude en la cocina). Si el puré de fruta se pega a la caserola, añada un poco de jugo de fruta o agua.

Retire la cacerola del fuego de la hornilla y deje enfriar. Mientras tanto, envuelva dos o tres platos con plástico. Heche el puré en los platos, y póngalos en un caja poco profunda. Cubra con una tela de estopilla o gaza.

Ponga la caja en el sol. Tomará de uno a tres días para que la fruta se convierta en "cuero". Mete la caja cada noche o si hay la posibilidad de que llueva. El cuero estará listo para comer cuando éste se pueda despegar del plástico. ¡Disfrútelo!

Unit 4

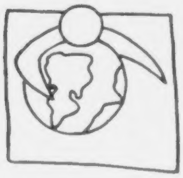
The Brilliant Balancing Act
Equilibrio y Ecosistemas

Introduction

This unit focuses on the concept of balanced systems. In particular, students are introduced to the concept of an ecosystem, and the complexities that define its balance. This unit provides them with an introduction to the fragility of the environment we live in, and the relationship between human activity and wildlife. Students explore the ways in which humans are "connected" to the environment and the role they can play in maintaining its balance.

Introducción

Esta unidad presenta el concepto de sistemas equilibrados. Se les presenta a los alumnos el concepto de un ecosistema y las relaciones complejas que definen su equilibrio. Esta unidad les ofrece una introducción a la fragilidad del ambiente en que vivimos y la relación entre la actividad humana y la vida silvestre. Los alumnos estudian acerca de las formas en qué los seres humanos están conectados con el medio ambiente y la función que ellos desempeñan para mantener su equilibrio.



Overview

Lesson 28: The Balanced Tangle: Understanding Ecosystems (Part I)

This lesson provides students with an opportunity to create a balanced ecosystem. Through the creation of their own system, students understand the complexities involved in maintaining a balanced environment.

Lesson 29: The Balanced Tangle: Understanding Ecosystems (Part II)

Students deepen their understanding of balance through an activity that demonstrates the interdependence between animals and plants living within an ecosystem.

Lesson 30: Who Needs Me?

Through a role-play activity, students are reintroduced to the five basic essentials needed by both animals and people. Students have the opportunity to discover what happens when an environment cannot provide these essentials.

Lesson 31: How Can We Help?

In this lesson, students work in their cooperative learning teams at work stations. At one station, they initiate a recycling project that will continue through the end of the year. At another, they are given the opportunity to create a "Circle Poem of Praise" to address some of the concepts they have learned, and to understand how differing "world views" impact our relationship with our natural environment. In addition, a papermaking project allows students to experience first-hand the joys and rewards of recycling.

Lesson 32: At Home in Your Watershed (Part I)

Students discover how they are connected to their environment and community through the identification of their ecological address. Students explore watersheds, how they work, and what actions they can take to protect them.

Lesson 33: Watershed Woes (Part II)

Using problem-solving and math skills, students determine that a watershed is a limited resource. Students begin to discover the importance of conservation and clean up.

Lesson 34: People, People Everywhere

Students deepen their understanding of limited resources by exploring populations and population growth. Through cooperation, students learn that there is room for all.

Lesson 35: Census Sweet Census

In this lesson, students continue their exploration of populations by conducting a census of Gummi Bears™.

Lesson 36: What We Know About Balance

In this culminating lesson, students review the concepts and vocabulary introduced in the unit while working cooperatively at work stations.

Resumen

Lección 28: La red equilibrada: ¿Qué es un ecosistema? (Parte I)

Esta lección le presenta a los alumnos una oportunidad de crear un sistema equilibrado. Al crear su propio sistema, los alumnos comprenden lo complejo que es mantener el equilibrio del ambiente.

Lección 29: La red equilibrada: ¿Qué es un ecosistema? (Parte II)

Los alumnos profundizan su comprensión del equilibrio por medio de una actividad que demuestra la interdependencia entre las plantas y los animales que viven en un ecosistema.

Lección 30: ¿Quién me necesita?

Por medio de una dramatización, los alumnos repasan los cinco elementos básicos que necesitan los animales y los seres humanos. Se les presenta la oportunidad de descubrir qué ocurre cuando el ambiente no puede proveer estos elementos esenciales.

Lección 31: ¿Cómo podemos ayudar?

En esta lección los estudiantes trabajan con sus grupos de aprendizaje cooperativo en los centros de trabajo. En uno de los centros de trabajo empiezan un projecto de reciclaje que continuará hasta el final del año escolar. En otro centro de trabajo se les va a dar la oportunidad de crear un "Poema de alabanza en círculo" para aplicar algunos conceptos que aprendieron, y comprender como "la forma de ver el mundo" impacta nuestra ralación con el medio ambiente. Como un proyecto adicional los estudiantes producirán hojas de papel. Este proyecto les permitirá disfrutar de los beneficios que se obtienen del reciclaje.

Lección 32: ¿Cómo es tu vertiente? (Parte I)

Los alumnos descubren cómo están relacionados con su ambiente y su comunidad al identificar su dirección ecológica. Exploran las vertientes de agua, cómo funcionan, y qué pueden hacer para protegerlas.

Lección 33: ¿Cuanto aguanta la vertiente? (Parte II)

Utilizando destrezas de matemáticas y resolución de problemas, los alumnos determinan que una cuenca de agua es un recurso limitado. Empiezan a descubrir la importancia de la conservación y la limpieza.

Lección 34: Gente, gente por todos lados

En esta lección, los alumnos profundizan su comprensión de cuan limitados son los recursos al explorar las poblaciones y su crecimiento. A través de la cooperación, aprenden que hay espacio para todos.

Lección 35: Censo, dulce censo

En esta lección, los alumnos continúan su exploración de las poblaciones haciendo un censo de Gummi Bears™.

Lección 36: ¿Qué sabemos del equilibrio?

En esta lección final, los alumnos repasan los conceptos y el vocabulario presentado en esta unidad al trabajar en forma cooperativa en los centros de trabajo.

Objectives

By the end of the unit, students will be able to:

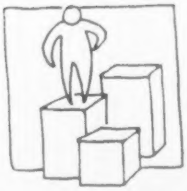
1. Understand and define the life science vocabulary introduced in this unit.
2. Discuss and write about the various components of an ecosystem.

3. Construct and design a graph.
4. Locate an ecological address.
5. Understand the impact they can have on their water supply.
6. Calculate the subtraction of one-ounce measurements from a limited supply of water.
7. Define a population.
8. Conduct a census of a small population.

Objetivos

Al terminar esta unidad, los alumnos podrán:

1. Comprender y definir el vocabulario presentado en esta unidad.
2. Discutir y escribir acerca de los elementos que componen un ecosistema.
3. Construir y diseñar una gráfica.
4. Localizar una "dirección ecológica".
5. Comprender el efecto que cada persona tiene sobre la provisión del agua.
6. Calcular la sustracción de medidas de una onza de agua de una provisión de agua limitada.
7. Definir una población.
8. Llevar a cabo un censo de una población pequeña.



Operating Grade Level

Most lessons in this unit are appropriate for grades 3-5. Be sure to review the content of each lesson to see if it is appropriate for the students in your group, and make adjustments according to their skill and interest levels.

Nivel de grado

La mayoría de las lecciones de esta unidad son apropiadas para los grados 3-5. Asegúrese de revisar el contenido de cada lección para ver si es apropiado para los alumnos del grupo y para adaptarlo a sus capacidades e intereses.

Suggested Quote/Cita sugerida

The following quote or one of your choosing, may be useful to initiate or continue discussions about ideas that are important in this unit and these lessons.

I change myself, I change the world.

—Gloria Anzaldúa, *The Fire in Our Souls*

Ms. Anzaldúa is co-author of *This Bridge Called My Back, Borderlands: The New Mestiza*, and most recently, the children's story "The Ghost Woman's Gift."

Me cambio a mi misma(o), y cambio el mundo.

— Gloria Anzaldúa

You may want to do the following with the quote:

- ☆ Introduce quote to students.
- ☆ Ask students to write it on newsprint and place it in a visible place such as the wall.
- ☆ Talk about the author.
- ☆ Brainstorm possible meanings and ways in which those meanings apply to the unit and to the lives of students, their families or communities.
- ☆ Ask students if the quote reminds them of something that their parents, grandparents or other family members would have said or agreed with.
- ☆ Ask students to re-state the quote in their own words (individually or in group).
- ☆ Look for opportunities to relate the quote to language arts activities or "Our Creative World" activities in work stations.
- ☆ Create a class "quote file" to which students can add quotes from this curriculum and those that parents, grandparents or other family members may share with them during the course of Academia.
- ☆ Ask students and adults to send in favorite sayings or proverbs of friends or family members, lyrics from songs, passages from books, original contributions that relate to math and science and nature or the environment, or to themes like perseverance, courage, determination, inspiration, identity, uniqueness or diversity.

Usted podría hacer lo siguiente con la cita:

- ☆ Introducir la cita a los alumnos.
- ☆ Pedir a los alumnos que escriban la cita en un papel de periódico y que lo pongan en un lugar visible como la pared.
- ☆ Repasar posibles significados y formas en las que estos significados puedan ser aplicables a la unidad y la vida de los estudiantes, sus familias o comunidades.
- ☆ Preguntar a los alumnos si esta cita les recuerda de algo que sus padres, abuelos, u otros familiares les hayan dicho o algo con lo que estos estarían de acuerdo.

- ☆ Pedir a los alumnos que vuelvan a plantear la cita en sus propias palabras (individualmente o en grupo).
- ☆ Buscar oportunidades para relacionar la cita con las actividades de lenguaje o las actividades de "Nuestro mundo creativo" en los centros de trabajo.
- ☆ Crear un "archivo de citas" de la clase al que los alumnos puedan añadir citas de este manual, y aquellas que los padres, abuelos, u otros miembros de la familia podrían compartir con ellos durante el curso de Academia.
- ☆ Pedir a los alumnos y personas adultas que manden sus dichos favoritos o proverbios de sus amigos o familiares, letra de canciones, pasajes de libros, contribuciones originales que estén relacionados con ciencias o matemáticas, la naturaleza o el medio ambiente o con temas como perseverancia, valentía, determinación, inspiración, identidad, singularidad o diversidad.

Cultural Link

The issues involved in maintaining healthy ecosystems while simultaneously engaging in economic development are big concerns throughout Latin America today. Conflicts between Mayan tribes, ecologists, and ranchers have kept Mexican government officials busy addressing social unrest and rebellion in the state of Chiapas. Pollution control along the U.S.-Mexican border was also a big issue in the negotiation of the North American Free Trade Agreement (NAFTA). For this lesson, it would greatly benefit students to study ecosystem problems that affect Latin America. This can present students with an understanding of the difficulties countries face when trying to address ecological and economic concerns.

Enlace cultural

El tema de mantener los ecosistemas o prestar servicio al desarrollo industrial es una preocupación grande para Latino América en estos dias. Los conflictos entre las tribus Mayas, los ecologistas y rancheros mantienen ocupados a los oficiales del gobierno mejicano que atienden a la inquietud social y la rebelión en el estado de Chiapas. El control de la contaminación junto a la frontera mejicana fue un tema importante en la negociación del Tratado Norte Americano de Libre Comercio (NAFTA). Para esta lección, sería muy benificioso que los alumnos estudiaran los problemas que estan afectando el ecosistema en Latino América. Esto presenta a los estudiantes un panorama realista de las dificultades que presenta la red equilibrada y los problemas ecológicos.

Parent Link Summary

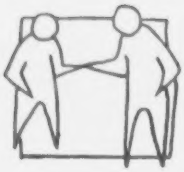
This unit's Parent Links involve families in discussions specifically related to Academia lessons and parents' cultural and personal experience with regard to water usage and conservation. Families also examine parents' world views, and participate in activities that deal with the relationship between human beings and nature, as well as concepts like preservation and balance.

Encourage students to write, draw, or talk about what they learned from their parents in the previous lesson's Parent Link during the Daily Homework/ Learning Option. Whenever possible, collect students' writing, drawings, or projects to share at the PAP meetings, to display on a bulletin board at the end of the unit, or to be acknowledged in other ways.

Resumen de enlaces familiares

El enlace familiar de esta unidad involucra a las familias en discusiones específicamente relacionadas con las lecciones de Academia, los enlaces culturales y las experiencias de los padres en relación al agua, su uso y su preservación. Las familias también examinan la forma en la que ven el mundo los padres y participan en actividades que tratan la relación de los seres humanos con la naturaleza, y conceptos de preservación y equilibrio.

Incentive a los estudiates a escribir, dibujar o hablar acerca de lo que aprendieron de sus padres en los enlaces familiares de las lecciones previas durante la opción diaria de tarea para la casa. Siempre que sea posible, recoja lo que los estudiantes escribieron, dibujaron o los proyectos que hicieron para compartir en la reunión de padres, para exhibirlos en el tablero informativo al terminar la unidad, o para que sean reconocidos de otras maneras.



Parents as Partners Link

This PAP session will introduce parents to the focus of this unit: the concept of balanced ecosystems. This unit looks at ecosystems and the delicate balance of life that must be maintained to preserve them. It allows students to understand the impact humans have on our environment. Students will explore the importance of maintaining balance in nature, and in the use of important resources such as water.

The movie the *Milagro Beanfield War* was based on the struggles of native New Mexicans to regain control of resources they claimed were theirs. A clip of this film could be used to illustrate this idea.

This PAP session will introduce parents to Lesson 28: "The Balanced Tangle." This lesson requires that participants balance twelve nails on the head of one stationary nail. During this activity PAP staff should walk through the room and encourage participants.

After the activity is completed, the focus can be shifted back to the need to maintain ecological balance and save our natural resources. For this discussion a representative from the local water department or another utility, can talk to parents about home energy and water conservation. Parents can be asked to work with their children at home to develop a plan to conserve resources.

Taking the lesson home to work on an energy plan is important to help parents establish an environment that respects the need for homework to improve math and science. To enhance the idea, distribute and discuss Project PRISM's "Homework is Part of Science and Math Success." This handout focuses on how to praise and encourage children's academic endeavors. It also addresses the establishment of productive homework rules and how to work with peers. These materials will reinforce a belief of the PAP program that parents must encourage students to achieve both at school and at home.

Suggested resources for this meeting are:

- Unit 4: "The Brilliant Balancing Act," copies of overview and unit objectives.
- Copies of Lesson 28: "The Balanced Tangle."
- Guest: representative of water department, or utility spokesperson.
- Project PRISM handout, "Homework is Part of Math and Science Success."

Reunión de padres

Esta reunión de padres presentará a los padres el concepto de sistemas equilibrados. Esta unidad estudia el ecosistema y el delicado equilibrio que debe mantenerse para preservarlo. Le permite a los estudiantes comprender el impacto que tienen los seres humanos sobre el medio ambiente. Los estudiantes investigarán la importancia de mantener el equilibrio de la naturaleza y el uso de recursos importantes como el agua.

La película "La Guerra de la siembra de habichuelas de Milagro" fue basada en las luchas que tuvieron los nativos nuevo mejicanos para volver a tomar control de los recursos que a ellos les pertenecian. Se puede usar un pequeño corte de esta película para ilustrar esta idea.

Esta reunión de padres les presentará la Lección 28: "La red equilibrada". Esta lección requiere que los participantes equilibren doce clavos en la cabeza de un clavo parado. Durante esta actividad el personal de la reunión de padres debe caminar por el salón de clases para incentivar a los participantes.

Después de que se termine la actividad, se puede volver a enfocar en el tema de la necesidad de mantener el equilibrio y preservar nuestros recursos naturales.

Para esta charla puede invitarse a un representante local del Departamento de Aguas, o de otras utilidades que puedan hablar a los padres acerca de la conservación del agua y la energía en la casa. Pida a los padres que trabajen con sus niños en casa para hacer un plan de conservación de recursos.

Llevar la lección a la casa para trabajar en el plan de preservar la energía es importante para ayudar a los padres a establecer un ambiente que respete la necesidad de tener tareas escolares para mejorar en la matemática y la ciencia. Para realizar la idea, distribuya y discuta la hoja de trabajo del proyecto PRISM titulada "La tarea es parte del éxito en ciencia y matemática". Esta hoja de trabajo se enfoca en cómo premiar e insentivar a los niños por sus esfuerzos académicos. Tambien establece las reglas para hacer tareas productivas y como trabajar en pareja.

El material del proyecto PRISM también refuerza la idea fundamental del programa de reunión de padres (PAP) que les urge incentivar a los estudiantes a lograr metas tanto en la casa como en la escuela.

Los recursos que se sugieren para esta reunión son los siguientes:

☆ Unidad 4: Copias del resumen y los objetivos de la unidad "Equilibrio y ecosistemas".

☆ Copias de la Lección 28: "La red equilibrada".

☆ Invitado: Un representante del Departamento de Aguas o un representante de otro tipo de utilidad.

☆ La hoja de trabajo del proyecto PRISM titulada "La tarea es parte del éxito en ciencia y matemática".

Parents as Partners Resource 4.1

Project PRISM's
Homework is Part of Science and Math Success

Good homework habits and skills build discipline and the ability to manage time. Time and effort spent practicing science and math and preparing for class does improve a student's schoolwork. Homework and schoolwork help open doors to colleges, technical schools, and future careers. Here are seven ways parents can help make home study worthwhile.

- Be generous with your praise. If you give praise when things go well, it is easier to help children if things go wrong.
- Set up a homework time each evening. Good study habits are learned through an easy-to-follow routine and can last a lifetime. Setting up a regular time also means that parents do not always have to ask repeatedly, "When are you going to do your homework?" or "When are you going to turn off that TV and do your schoolwork?" If a child needs help getting homework done, parents can help by reviewing the assignment and helping the child do the work one step at a time.
- Agree on a good place for your child to study. This can be at home, in a study center, community center, church, or library. It should be free from distractions such as television. Spending some time with your child planning his or her study place and making it comfortable and pleasant can show him or her that homework is important.
- Encourage your child to work with peers. Students learn a lot from each other, and working with friends can make schoolwork more enjoyable.
- Be there to lend a hand if your child needs help. Encouragement can build confidence, and seeing homework can inform parents about science and math programs. There are many things you can do to help. You can work through materials with your child, calling a teacher when necessary, or getting some help from another adult with a background in the subject area. If parents know what assignments, tests, and quizzes their children have, they will be able to judge if additional help is needed in a particular subject.
- Plan family activities to reinforce science and math learning at school. A great book from the library or a museum visit can bring classroom studies to life.
- Be a role model for your child. If parents bring "homework" from their jobs or read or write in the evening, children see that they value education, including homework.
- A child who sees family members reading at home, or hears positive remarks about education, or sees some art or writing that a parent or adult has done, is positively affected. When adult family members enjoy learning and value education, so will their children.
- Without a positive attitude about learning, a child's prospects may be very limited. With a positive attitude, a curious mind, and well-directed energies, a child can attain just about any educational goal.

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* Project PRISM is a program of National Urban League, Inc. in association with the National Council of La Raza, The NETWORK, Inc., and Thirteen/WNET, and funded by The Annenberg/CPB Math and Science Project.

Recurso para reunión de padres 4.1

"La Tarea es Parte del Exito en Ciencia y Matemática" del Proyecto PRISM

El tiempo y esfuerzo gastado en la práctica de ciencia y matemática y preparación para clase contribuye mucho a los buenos resultados en la escuela. Las buenas costumbres en la producción de tareas y el desarrollo de habilidades también crean disciplina y la habilidad de manejar bien el tiempo. Las tareas y el trabajo escolar ayudan al niño a prepararse para la universidad, escuelas técnicas y carreras en el futuro. Los padres pueden ayudar a que el tiempo de estudio en la casa sea productivo.

- ☆ Sea generoso con sus alabanzas. Cuando los niños hacen bien los padres deben asegurarse de alabarlos. Hay veces que le decimos las cosas que han hecho mal y nos olvidamos de aplaudirles los trabajos bien hechos. Los niños crecen y florecen con alabanzas de los adultos. Al acentuar lo positivo, es más fácil ayudarlos cuando las cosas van mal.
- ☆ Separe tiempo para la tarea todas las tardes. Las buenas costumbres se aprenden a través de una rutina fácil de seguir. Una hora regular para el estudio — cuando la televisión y música estén apagadas y la casa este más callada — le ayuda a los niños a desarrollar buenas costumbres que le pueden durar toda una vida. Separar un tiempo regular para la tarea también quiere decir que los padres no siempre van a tener que reguntar, "¿Cuándo vas a hacer tu tarea?" o "¿Ya está hecha tu tarea?" o "¿Cuándo vas a apagar la televisión y a hacer tu tarea?" Si el niño necesita ayuda para hacer la tarea, los padres pueden ayudar revisando las asignaciones y ayudando al niño a hacer la tarea paso a paso.
- ☆ Póngase de acuerdo sobre un buen lugar donde su hijo puede estudiar. Un buen lugar para estudiar puede ser en casa o en un centro de estudio (una biblioteca, centro comunitario, o una iglesia). Este lugar debe ser libre de distracciones como la televisión. Tome tiempo con su hijo para planear el lugar donde él o ella pueda estudiar y haga el lugar cómodo y agradable. Esto le puede mostrar que la tarea escolar es importante.
- ☆ Anime a su hijo a trabajar con amigos. Los padres pueden ayudar a sus hijos a reunir grupos de estudio permitiéndole invitar a sus amigos para estudiar. Aunque los padres deben estar allí para supervisar a estos grupos, estos son importantes porque los estudiantes aprenden mucho de cada uno y la experiencia de trabajar juntos refuerza positivamente la importancia de hacer los trabajos escolares. Hay veces que los maestros quieren que los estudiantes trabajen solos. Es posible que los padres tengan que discutir la cuestión de trabajar en grupos en vez de trabajar individualmente con el niño, o su maestra(o).
- ☆ Esté atento para darle una mano a su hijo si necesita ayuda. El refuerzo que reciben los niños de parte de los adultos crea confianza en ellos mismos y amor propio. También puede crear fuertes vínculos con el trabajo escolar a los que se pueden recurrir cuando las cosas no van tan bien. Empezando los trabajos con su hijo, llamando a la maestra cuando es necesario u obteniendo ayuda de otro adulto con un conocimiento en esta materia — todos estos son modos en que los padres pueden ayudar.

Recurso para reunión de padres 4.1 (Cont.)

Si los padres saben que asignaciones, exámenes, y pruebas tienen sus hijos, ellos podrán saber si necesitan ayuda adicional en esa materia particular. ¡Cuando un niño hace bien en los exámenes y pruebas, es otra oportunidad para los padres de ofrecer alabanzas! Cuando el niño no tiene buenos resultados en los exámenes y las pruebas estas prácticas pueden ayudar a detectar las áreas donde él/ella necesita ayuda.

☆ Refuerce el aprendizaje de ciencia y matemática en la escuela con actividades familiares. Hay muchos recursos en la comunidad que le pueden ayudar a los niños a aprender. Un paseo al museo de ciencia puede darle vida a los temas que está aprendiendo en ciencia o matemática. Una visita a la biblioteca puede revelar un libro maravilloso de dibujos o una biografía de un científico o matemático. El Urban League, Boys and Girls Club, u otras organizaciones comunitarias o iglesias pueden tener grupos de lectura para que los estudiantes puedan aprender juntos. Muchas actividades familiares que se organizan para diversión también pueden reforzar el aprendizaje. Ir al teatro, al parque o al grupo de lectura de la biblioteca con su hijo puede ser divertido. Estas actividades también son maneras positivas de apoyar la educación de sus niños.

☆ Sea un modelo ejemplar para su hijo. Las escuelas desarrollan las habilidades de su hijo y ayudan a aumentar su sabiduría. Pero los padres y otros adultos importantes en las vidas de los niños pueden formar actitudes y opiniones sobre el aprendizaje. Sin una actitud positiva sobre el aprendizaje, el prospecto de un niño puede ser muy limitado. Con una actitud positiva, una mente curiosa y energías bien dirigidas, un niño puede obtener casi cualquier meta educacional.

☆ Si los padres traen "tareas" de sus trabajos, o toman clases ellos mismos, los niños verán que usted valora la educación, incluyendo las tareas. Un niño que observa a miembros de la familia leyendo en casa, o escucha opiniones positivas sobre la educación, o ve un escrito o algún tipo de arte que un padre o un adulto haya creado recibe una impresión positiva. Cuando a un miembro adulto de la familia le gusta aprender o valora la educación, los niños también lo harán.

☆ Si un niño tiene una actitud negativa relacionada con estudiar y aprender, sus perspectivas y probabilidades son muy pocas. Pero si tiene una actitud positiva, una mente curiosa y la energía bien canalizada y dirigida, un niño puede logar cualquier meta educativa que se proponga.

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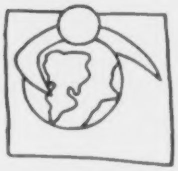
* Fragmento tomado de hoja de trabajo producida por el Proyecto PRISM, un programa del National Urban League, Inc., en asociación con el Consejo Nacional de La Raza, The NETWORK, Inc., y Thirteen/WNET, patrocinado por el Proyecto de Ciencia y Matemáticas del Annenberg/CPB

Lesson 28

The Balanced Tangle: Understanding Ecosystems (Part I)
La red equilibrada: ¿Qué es un ecosistema? (Parte I)



Overview

This lesson provides students with an opportunity to create a balanced system of their own. Through doing so, they begin to understand the complexities involved in maintaining a balanced environment. This lesson, and Lesson 29 use activities developed by the National Science Foundation for National Science and Technology Week.

Resumen

Esta lección ofrece a los alumnos la oportunidad de crear un sistema equilibrado. Al crear su propio sistema, los alumnos comprenden lo complejo que es mantener el equilibrio del ambiente. Esta lección y la Lección 29 utilizan actividades desarrolladas por el National Science Foundation para la Semana Nacional de Ciencias y Tecnología.

Key Skills

Simulating

Experimenting

Analyzing

Synthesizing

Inferring

Destrezas claves

Hacer simulaciones

Experimentar

Analizar

Sintetizar

Hacer inferencias

Preplanning

1. Read "Background for the Teacher."
2. Review the following vocabulary:

** ecosystem*	** ecosistema*
** balance*	**equilibrio*

Backgroud for the Teacher

Scientists have spent a great deal of time trying to understand life on land and in the water. Although a single plant or animal is worth studying by itself, scientists have come to realize that any given species of life cannot support itself for very long without others. Instead of viewing the natural world as a mass of individual species, scientists are now coming to view life in any given area as a group of species that work according to their own individual instincts for survival, yet also fulfill an observable role in interacting with other species. It is this interaction that ensures the continuation of each individual species. Although life on our planet is highlighted by individuals, their survival is totally dependent on a system of other life and elements. Within environments, the source of food, water, air, or nutrients differs. As the sources differ, so do the species and their interactions. Each environment promotes a distinct and localized network of the living and nonliving, forming what is commonly called an ***ecosystem**. Wetlands, for example, are one ecosystem that scientists are studying. Wetlands are generally characterized as areas that are consistently damp, shallowly covered by water, or waterlogged.

Wetlands can be found in coastal areas or further inland where streams and rivers create similar habitats. The land that surrounds where a river meets the ocean is called an estuary. Estuaries have flat, soggy land riddled by small channels of water. During each tide, salty water floods the channels and soaks into the soil. This special type of wetland is a world teeming with life. A variety of plants grows abundantly in these changing conditions. The fine roots of plants hold the thick, shiny mud of the salt marsh which in turn captures nutrients and, by doing so, encourages the growth of other plants. The energy that all living things need comes from such plants. Plants use the sun and nutrients in the soil to grow. When eaten, the energy of the plant is transferred to other organisms. The non-living nutrients found in the mud are an important aspect that determines the type of wetland plants and the speed at which particular ones will grow. Animals that eat the plants in this ecosystem benefit from the energy and nutrients stored in the plants. In the salt marsh, for example, young crabs and snails feed on the plants. In turn, they are eaten by wading birds such as the sheldrake, which eat fish, shellfish, and worms. As the plants and animals in the wetland die, bacteria growing in the mud act as decomposers, freeing nutrients and making them available once again.

Understanding wetlands is particularly important since many acres are annually drained or filled for the construction of buildings.

Wetlands serve an important purpose. Rain and ground water are absorbed and filtered by the soil. The absorption helps prevent flooding and filters out many harmful pollutants. Wetlands are also a source of fresh water for many species of birds. America's tallest bird, the whooping crane, has been threatened by the destruction of wetlands. Such birds depend on these areas for food and rest during summer and winter migrations. Only after such areas were identified and protected did this population begin increasing. Scientists are beginning to realize that protection of a single ***ecosystem** like a wetland ensures the protection of many individual species of plants and animals.

Examples of other ecosystems include the forest, the rainforest, and the desert.

Información para el/la maestro/a

Por mucho tiempo los científicos han tratado de comprender la vida sobre la tierra y en el agua. Aunque es importante estudiar una sola planta o animal, los científicos se han dado cuenta de que ninguna especie puede sobrevivir sin las demás. En vez de ver el mundo natural como un conjunto de especies individuales, los científicos han llegado a comprender que la vida en cualquier área consiste de un grupo de especies que sobreviven según sus instintos individuales, pero que también tienen una función importante en su relación con otras especies. Esta interacción es lo que asegura la continuación de cada especie individual.

Aunque la vida en nuestro planeta se caracteriza por el organismo individual, la supervivencia de cada uno depende totalmente de un sistema de otra vida y otros elementos. Dentro de cada medio ambiente, la provisión de alimento, agua, aire o nutrientes es diferente. Así cómo los elementos son diferentes, también las especies y sus interacciones son diferentes. Cada ambiente construye una red local y definida de seres vivientes y no vivientes, formando lo que comúnmente se llama un ***ecosistema**. Por ejemplo, los terrenos húmedos son un ecosistema que los cienfícos están estudiando. Se les dice tierras húmedas a las áreas mojadas, pantanosas, o cubiertas de agua poco profunda.

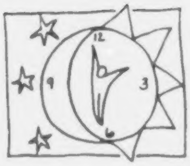
Las tierras húmedas se encuentran en las areas de la costa, o donde los arroyos y ríos crean hábitats parecidos. La tierra alrededor de la salida de un río al mar se llama estuario. Los estuarios son terrenos planos y empapados de agua, llenos de pequeños canales. Durante cada marea, el agua salada inunda los canales y empapa la tierra. Este tipo especial de tierra húmeda es un mundo lleno de vida.

Bajo estas condiciones de cambio constante, abunda una gran variedad de plantas. Las finas raíces de las plantas detienen el espeso lodo del pantano salado, que a su vez captura los nutrientes, fomentando de esta manera el crecimiento de otras plantas. La energía que necesita todo ser viviente viene de tales plantas. Las plantas utilizan el sol y los nutrientes de la tierra para crecer. Cuando se comen, la energía de la planta se transmite a otros organismos. Los nutrientes no-vivientes que se encuentran en el lodo son un aspecto importante que determina qué tipo de planta crecerá y cuánto tardará en crecer. Los animales que comen las plantas en un ecosistema se benefician de la energía y los nutrientes almacenados en ellas. Por ejemplo, en el pantano salado, los pequeños cangrejos y caracoles se alimentan de las plantas. A su vez, de ellos se alimentan las aves acuáticas que comen peces, mariscos y gusanos. Al morir las plantas y los animales de la tierra húmeda, las bacterias que crecen en el lodo actúan como descompositores, liberando los nutrientes para que se vuelvan a aprovechar.

Es de especial importancia comprender las tierras húmedas, porque cada año se vacían muchas hectáreas o se rellenan para construir edificios.

Las tierras húmedas tienen un propósito importante. La lluvia y el agua corriente se absorbe y se filtra por la tierra. La absorción ayuda a prevenir las inundaciones y sirve para filtrar muchos contaminantes dañinos. Las tierras húmedas también proveen agua fresca para muchas especies de aves. El ave más alta de América, la grulla, está en peligro por la destrucción de las tierras húmedas. Estas aves dependen de estas areas para alimentarse y descansar durante sus migraciones de verano e invierno. Esta población comenzó a crecer únicamente después de que se se identificaran y se protegieran estas areas. Los científicos se están dando cuenta de que la protección de un solo ***ecosistema**, como el de tierras húmedas, asegura la protección de muchas especies individuales de plantas y animales.

Otros ejemplos de ecosistemas son el bosque, la selva tropical y el desierto.



Suggested Time

15 minutes — Welcoming
45 minutes — Homework/Learning Options
25 minutes — "On The Head of a Nail"
25 minutes — Guided Discussion/Debriefing
10 minutes — Closing

2 hours total

352

Materials

Since the class will be breaking into small groups or pairs, a teacher and teaching assistant are recommended for full implementation of this lesson. In addition, you will need the following for each pair or small group:

- (12) 8-penny nails with flat heads (not finishing nails).
- Paper and pencil.
- One large nail.
- One piece of scrap board approximately 6 centimeters square or a mound of clay which could hold the nail adequately.
- Student journals.

Suggested Quote/Cita sugerida

The following quote or one of your choosing, may be useful to initiate or continue discussions about ideas that are important in this unit and these lessons.

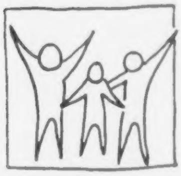
I change myself, I change the world.

— Gloria Anzaldúa, as quoted in *The Fire in Our Souls*

Ms. Anzaldúa is co-author of *This Bridge Called My Back, Borderlands: The New Mestiza,* and most recently, the children's story "The Ghost Woman's Gift."

Me cambio a mi misma(o), y cambio el mundo.

— Gloria Anzaldúa



Welcoming (15 minutes)

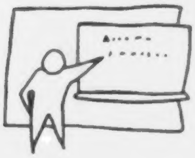
Welcome students and take attendance. Ask students if they know what a ***balance** is. What happens if you loose your ***balance**? Familiarize students with this word and tell them that this unit talks about the things that can happen if nature becomes out of balance, and why maintaining balance is so important. Ask students if they remember the activity they did in Unit 2 where the caterpillars had to live on the pavement instead of in the grass. What happened to the caterpillars? [They were seen more easily. It was easier for birds to see them, and harder to find food they needed on the pavement.] Listen to the responses. Tell them that all of these answers mean that things were no longer in ***balance**.

Suggestion...

As a demonstration, Monica Incerti of Centro Latino de San Francisco asked students to ***balance** themselves on a small piece of wood without letting their feet touch the floor. Let students explore balance. Can they balance themselves on one foot?

Homework/Learning Options (45 minutes)

Students may use this time to complete homework, engage in free reading, or do any other program-related academic activity.



Curriculum

On The Head of a Nail (25 minutes)

Divide the class into working pairs or small groups. While working on a flat counter or table surface, have each group secure the larger nail to a mound of clay or the scrap board. The larger nail should be straight up and down with the pointed end embedded securely in the wood or clay.

Tell students:

"I would like you to create a ***balanced** system by arranging the remaining twelve nails so that they are all balanced on the head of the one stationary nail."

Dígale a los alumnos:

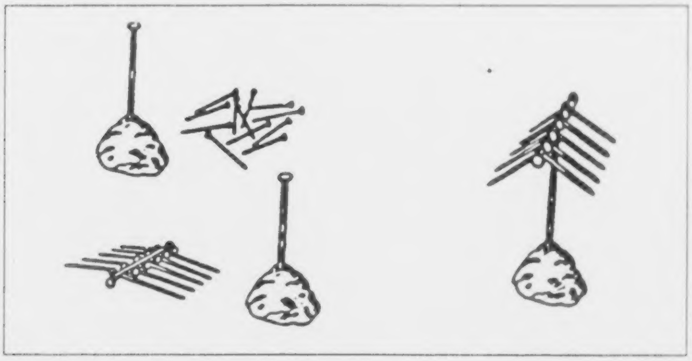
"Quisiera que ustedes crearán un sistema ***equilibrado** colocando estos doce clavos sobre la cabeza de un clavo fijo. Procuren que todos los clavos queden equilibrados sobre el clavo fijo".

Allow plenty of exploratory time for students to experiment with different arrangements for the nails. Although the diagram below (See Figure 1) suggests one arrangement, several configurations are possible, and different student pairs may complete the task with different solutions. (One hint that may help those students who become frustrated is to assemble their "system" on the table first, then lift the entire collection of nails together to "balance" them on the head of the upright nail.)

Suggestion...

This is a difficult activity. Prevent your students from getting frustrated by providing plenty of assistance and hints, especially to younger students.

Figure 1



After at least a few of the students have successfully balanced their systems, have them record their system with a drawing and a description of it in their journals. Share these successful systems with the whole class, and allow time for each group to try another group's system.

Guided Discussion/ Debriefing (25 minutes)

Tell students:

"The earth's natural systems have a ***balance**, and the various components or parts of any system must interact and work together to achieve and maintain this balance. Just like the 12 nails form a balanced system on the head of the larger, upright nail, systems in nature must demonstrate a similar balanced relationship between all of their components in order to thrive. This may include a complex system of biological, chemical, and physical conditions and organisms, all interacting and dependent on each other for a balanced ***ecosystem**. For example, if the bats we studied in Unit 2 become extinct — if there are no more bats — what would happen to the fruit trees that need bats to disperse their seeds? Maybe in time all these trees would die because there would be no new trees. And, what if there were an insect that had to build its home in these trees? No more insects. The bats are therefore needed to keep the balance."

Dígale a los alumnos:

"Los sistemas naturales de la tierra tienen un ***equilibrio** y los varios elementos o partes de cualquier sistema tienen que cooperar entre sí para lograr y mantener este ***equilibrio**. Al igual que los 12 clavos forman un sistema equilibrado cuando están balanceados en la cabeza del clavo grande, para funcionar bien los sistemas de la naturaleza también tienen que demostrar una relación equilibrada entre todas sus partes. Esto puede incluir un sistema complejo compuesto de condiciones y organismos biológicos, químicos y físicos relacionados entre sí, que dependen de los demás para sostener un ***ecosistema** equilibrado".

Por ejemplo, si los murciélagos que estudiamos en la segunda unidad se extinguieran — si ya no existieran murciélagos — ¿qúe les pasaría a los árboles frutales que necesitan de los murciélagos para dispersar sus semillas? Quizás con el tiempo todos estos árboles se extinguirían porque no nacerían nuevos árboles. ¿Y qué le pasaría a los insectos que viven en estos árboles? Ya no habrían. Se necesitan los murciélagos para mantener el equilibrio".

To help students with these concepts, ask them the following questions:

☆ How does this system of nails balance?

☆ What members (nails) of this system depend on other members (nails)?

☆ How many nails can be removed before the system becomes unbalanced and fails?

☆ How could additional nails be added to this system?

☆ What are some natural ecosystems?

☆ What parts of an ecosystem do the nails represent?

☆ How do natural ecosystems become unbalanced?

Pregúntele a los alumnos:

☆ ¿Cómo está equilibrado este sistema de clavos?

☆ ¿Cuáles miembros (clavos) de este sistema dependen de los demás (clavos)?

☆ ¿Cuántos clavos se pueden quitar antes de que el sistema pierda su equilibrio y se caiga?

☆ ¿Cómo se podrían agregar más clavos a este sistema?

☆ ¿Cuáles son algunos ecosistemas naturales?

☆ ¿Qué partes de un ecosistema representan los clavos?

☆ ¿Cómo pierden su equilibrio los ecosistemas naturales?

Rationale...

It is important to ask these questions during the debriefing session to help students make the connection between the balanced system they created using nails, and the ecosystems found in nature. What might happen to an ecosystem if an animal or a plant found within it became extinct?

Razón fundamental...

Es importante hacer estas preguntas al terminar la lección para ayudar a los alumnos a relacionar el sistema equilibrado que crearon con los clavos a los ecosistemas naturales. ¿Qué le podría suceder a un ecosistema si uno de sus animales o plantas se extinguiera?

Closing (10 minutes)

Tell students that they did a very good job in trying to accomplish something that was very difficult (balancing 12 nails on the head of one). Tell students that in the next lesson, they will learn about one special type of ecosystem called a wetland.

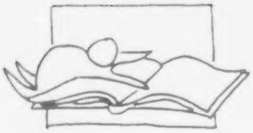
Parent Link

For this lesson and Lesson 29, have students talk to an immediate family member, relative or neighbor who came to the United States from another country (or who used to live in another region in the U.S.). Have students ask this person questions about the ecosystems of their homeland. Students can ask this person if s/he came from a dry or wet area, what animals lived in these zones, what plant life grew there, how people dressed, etc. (Ask students not to be discouraged if the people immediately around them have always lived in the U.S.) They may have lived in other parts of this country where differences can be pretty radical and just as important to find out about. If photos of this place are available, have students photocopy them (or, have younger grades draw them) and glue them, collage-like, onto construction paper under which they can write a one- or two-paragraph report of their findings.

Enlace familiar

Para esta lección y la Lección 19, pida a los estudiantes que hablen con el familiar más cercano, pariente o vecino que vino a los Estados Unidos de otro país o que usaba vivir en otra región de los Estados Unidos. Los estudiantes deben preguntar a esta persona sobre el ecosistema de su país natal o de su región estadounidense previa. Los estudiantes pueden preguntarle a esta

persona si él/ella viene de un lugar mojado o seco, qué animales viven en esa zona, qué plantas crecen allá, como se viste la gente, etc. (Diga a los estudiantes que no se desanimen si la gente que vive a su alrededor ha vivido siempre en los Estados Unidos. Tal vez ellos han vivido en otras partes del país donde las diferencias pueden ser bien marcadas y tienen la misma importancia para investigarse). Si cuenta con fotografías de estos lugares, pida a los estudiantes que las fotocopien (o que las dibujen) y las peguen como un collage en un papel de construcción debajo del cúal pueden escribir uno o dos párrafos reportando sus investigaciones.

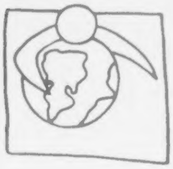


Literature Link

The People Who Hugged the Trees, adapted by Deborah Lee Rose, (recommended for grades K-5), and *Who Really Killed Cock Robin*, by Jean C. George, (recommended for grades 3-7), provide wonderful non-fictional and fictional accounts of balance.

Lesson 29

The Balanced Tangle: Understanding Ecosystems (Part II)
La red equilibrada: ¿Qué es un ecosistema? (Parte II)



Overview

Students deepen their understanding of balance through an activity that demonstrates the interdependence between animals and plants living within an ecosystem.

Resumen

Los estudiantes profundizan su entendimiento del equilibrio haciendo una actividad que demuestra la interdependencia que existe entre los animales y plantas que viven dentro de un ecosistema.

Key Skills

Simulating

Experimenting

Analyzing

Synthesizing

Inferring

Destrezas claves

Hacer simulaciones

Experimentar

Analizar

Sintetizar

Hacer inferencias

Preplanning

1. Prior to class, use the list found in Table 1 to print out a role card for each student. Select 4-5 different webs, and write a single web component (Algae, Osprey, etc.) on each card. Punch a hole in the top two corners of each card, and string a piece of yarn about 2 feet in length through the holes (tying a loop that can later be placed over the student's head). These cards will be worn by

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* In this lesson, a web refers to what is more commonly known as the food chain.

students to identify their role clearly to the entire class while playing the game. Make one role card with the word "Sun."

The following table provides a list of some possible food web combinations. At the beginning of each web are the producers who make their own food using the sun's energy, nutrients in the soil and water for survival. They are eaten by the second level, Primary Consumers, who in turn are eaten by the next level, Secondary Consumers, and so forth. For the purposes of the game, bacteria — which represent decay — will conclude each food web. The ball of yarn should be passed from the bacteria to the person representing nutrients. In this way, the cycle begins again.

The following list provides wetland roles for a class of 30 children.

Table 1

Web 1
Algae
Mosquitos
Fish Larva
Large Mouth Bass
Osprey
Bacteria
Nutrients

Web 2
Algae
Mosquitos
Pickerel
Frog
Great Blue Heron
Bacteria
Nutrients

Web 3
Cattail
Muskrat
Raccoon
Hawk
Bacteria
Nutrients

Web 4
Algae
Fresh Water
Clam
Otter
Bacteria
Nutrients

Web 5
Algae
Mosquito
Dragonfly
Red Winged Blackbird
Bacteria
Nutrients

Web 6
Algae
Mosquito
Bat
Snake
Bacteria
Nutrients

Web 7
Duckweed
Snails
Duck
Raccoon (eggs)
Bacteria
Nutrients

Web 8
Fern
Deer
Bacteria
Nutrients

Web 9
Cypress Tree
Beaver
Otter
Bacteria
Nutrients

Web 10
Algae
Crab
Croaker
Terrapin
Bacteria
Nutrients

Tabla 1

Red 1

Alga
Mosquito
Larva de pez
Lobina de boca grande
Bacteria
Nutrientes

Red 2

Alga
Mosquito
Pez de agua dulce
Rana
Garza
Bacteria
Nutrientes

Red 3

Hierba acuatica
Rata almizclada
Mapache
Halcon
Bacteria
Nutrientes

Red 4

Alga
Agua dulce
Almeja
Nutria
Bacteria
Nutrientes

Red 5

Alga
Mosquito
Libélula
Mirlo
Bacteria
Nutrientes

Red 6

Alga
Mosquito
Murcielago
Culebra
Bacteria
Nutrientes

Red 7

Lenteja de agua
Caracoles
Pato
Mapache (huevos)
Bacteria
Nutrientes

Red 8

Helecho
Venado
Bacteria
Nutrientes

Red 9

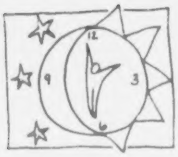
Cipres
Castor
Nutria
Bacteria
Nutrientes

Red 10

Alga
Cangrejo
Graznador
Terrapene
Bacteria
Nutrientes

2. Make one copy of the "Eco-Cube pattern" for each student.
3. Review "Background for the Teacher" provided in Lesson 1.
4. Review the following vocabulary:

* *food chain*	**cadena alimenticia*
* *bacteria*	* *bacteria*
* *nutrients*	* *nutrientes*



Suggested Time

10 minutes — Welcoming
45 minutes — Homework/Learning Options
20 minutes — The Tangled Web
20 minutes — Guided Discussion
15 minutes — Debriefing
10 minutes — Closing

2 hours total

Materials

A teacher can conduct this lesson alone, if necessary. You will need the following materials:

- 5-10 balls of different colored yarn (one ball for each food web used in the activity).
- 4" x 6" note cards for each student.
- Colored felt pens or crayons.
- Handout 29.1: "Eco-Cube pattern."
- Glue.

Suggested Quote/Cita sugerida

The following quote or one of your choosing, may be useful to initiate or continue discussions about ideas that are important in this unit and these lessons.

I change myself, I change the world.

— Gloria Anzaldúa as quoted in *The Fire in Our Souls*

Ms. Anzaldúa is co-author of *This Bridge Called My Back, Borderlands: The New Mestiza,* and most recently, the children's story "The Ghost Woman's Gift."

Me cambio a mi misma(o) , y cambio el mundo.

— Gloria Anzaldúa

SESSION PLAN

Welcoming (10 minutes)

Welcome students and take attendance. Review with students the concepts learned in Lesson 1 (the importance of balance). Tell them that today they will learn how one type of ***ecosystem** is balanced.

Homework/Learning Options (45 minutes)

Students should use this time to complete homework assignments, do free reading, or receive individualized tutoring.

Curriculum

The Tangled Web (20 minutes)

Hand out role cards to each student and have them sit in a circle, wearing the card around their neck so their "role" is visible. Ask students to identify which organisms rely directly on the sun for their healthy growth and reproduction (plants such as algae, cattail, duckweed, fern, and cypress tree).

The student that represents the sun will hold a ball of yarn that is passed as members of the food web are identified. For example, if the algae are identified as needing the sun for survival, then the ball of yarn is passed to the student labeled "algae," while the sun continues to hold the end of the yarn. Once the class determines what wetland organism needs algae for survival, the ball of yarn is passed to that identified member of the web. Once the class identifies them properly, have the "sun" roll the yarn to the student labeled "algae" and begin making the web.

Repeat the questioning and sharing until the next level of each web is identified. Having students describe their roles to the class during this process will help build a better understanding of the interdependence between roles in each web. ***Bacteria** and ***nutrients** complete the webs as decomposers, and non-living material. Discuss with students the cyclical nature of their webs and review each student's role as a group.

[The accompanying chart found in Table 1 identifies many possible webs. Be sure that each ball originates from the sun. New and correct webs will, undoubtedly, be identified by the class. Participants such as algae or mosquitoes may have the ball of yarn passed to them as part of several webs, thereby indicating their importance to more than one species in the wetland ecosystem.]

Ask each student:

"What role do you play as a (label on card) in the ecosystem?

When they die, what happens to the animals or organisms at the end of the ball of yarn?"

Pregunte a los alumnos:

"¿Qué papel desempeñas como un (nombre en la tarjeta) en un ecosistema?

¿Qué les pasa a los animales y organismos que están en la punta del estambre cuando se mueren?"

Guided Discussion (20 minutes)

To help improve student understanding of the concepts, ask them the following questions:

- ☆ Which members of the web received more than one ball of yarn?
- ☆ What happens if a web member, like the mosquitoes, disappears?
- ☆ What is the first part of the web? Why? Could any part of the web be replaced? If so, with what?
- ☆ Are members of the web in competition?
- ☆ Why are bacteria and nutrients continually at the end of the food chain?

Tell students that this system, in which one organism needs another to survive, is often called the ****food chain***. Ask if anyone knows why it has this name.

Pregunte a los alumnos:

- ☆ ¿Qué miembros de la red recibieron más de una bola de estambre?
- ☆ ¿Qué pasaría si un miembro de la red, por ejemplo los mosquitos, desapareciera?
- ☆ ¿Cuál es la primera parte de la red? ¿Por qué? ¿Se puede reponer cualquier parte de la red? ¿Con qué?
- ☆ ¿Hay miembros de la red que estan en competencia?
- ☆ ¿Porqué la bacteria y los nutrientes están siempre al final de la cadena alimenticia?

Debriefing (15 minutes)

Have students cut out and color the "Eco-Cube" (Handout 29.1). They can finish the activity at home, if necessary. Provide the students with instructions for completing the cube. [Color and cut out pattern of cube. Glue tabs.] While students are coloring their cube, discuss with them the six different types of wetlands they see on the cube. Explain to them that these wetlands, like others, are nurseries for many species as well as feeding grounds for many migrating birds. Each environment supports a large number of unique species of plants, fish, insects, birds, and other animals.

Dígale a los alumnos:

"En los Estados Unidos hay una gran variedad de tierras húmedas. Este cubo demuestra seis tipos diferentes de tierras húmedas. Cada ambiente sostiene una gran cantidad de especies únicas de plantas, peces, insectos, pájaros, y otros animales. Estas tierras húmedas, como otras, son criaderos para muchas especies de animales y ahí se alimentan muchos pájaros migratorios".

Closing (10 minutes)

Review the concepts that were learned in this lesson. Ask students how they would explain what they've learned about food chains to their parents.

Extension Activity

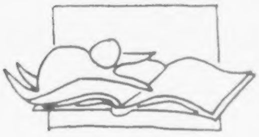
You may want to show students Walt Disney's *The Lion King* which contains a nice explanation of the "circle of life," understandable even to small children.

Parent Link

Please refer to previous lesson.

Enlace familiar

Por favor refiérase a la lección previa.

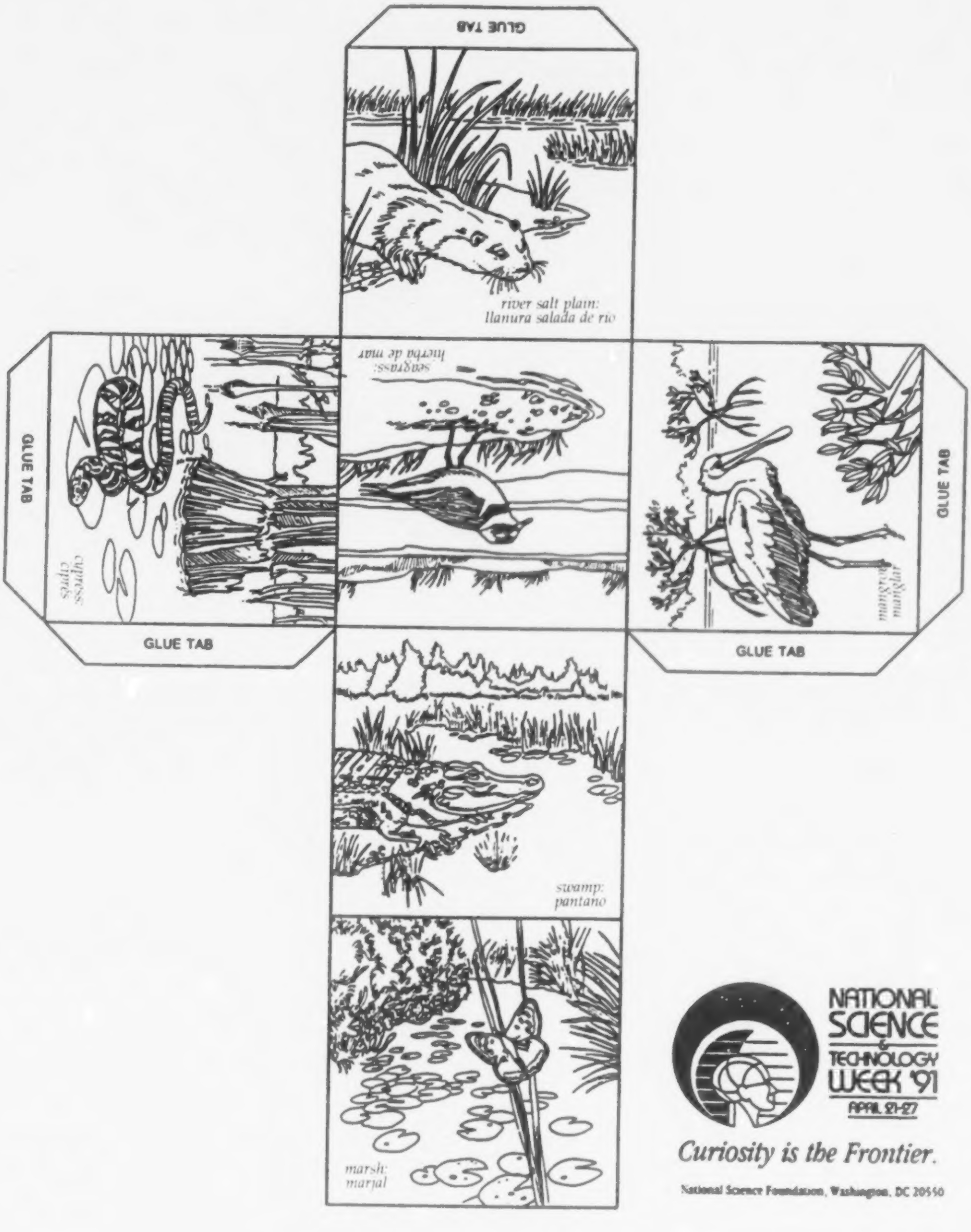


Literature Link

In Spanish, *Salven mi selva*, by Monica Zak, helps make children aware of the need to save our precious natural resources. It is based on a true story about a young Mexican boy who tries to save an ecosystem — the last jungle in Mexico. [Available from Hispanic Books Distributors.] Recommended for grades 3-6.

Handout 29.1/Hoja de trabajo 29.1

Eco-Cube Pattern/Diseño del eco-cubo



NATIONAL SCIENCE & TECHNOLOGY WEEK '91
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Lesson 30

Who Needs Me?
¿Quién me necesita?

Overview

Through a role-play activity, students are reintroduced to the five basic essentials needed by both animals and people. Students have the opportunity to discover what happens when an environment cannot provide these essentials.

Resumen

Por medio de una dramatización, los alumnos repasan los cinco elementos básicos que necesitan los animales y los seres humanos. Se les presenta la oportunidad de descubrir qué ocurre cuando un ambiente no puede proveer estos elementos esenciales.

Key Skills

Simulating

Analyzing

Synthesizing

Writing

Destrezas claves

Hacer simulaciones

Analizar

Sintetizar

Redactar

Preplanning

1. Review the "Background for the Teacher" provided in Lesson 28, and the five basic essentials mentioned in Lesson 29.
2. The instructions for the activity in this lesson are somewhat complicated and detailed. Be sure to review them carefully.

Suggested Time

10 minutes — Welcoming
45 minutes — Homework/Learning Options
10 minutes — Discussion
25 minutes — Who Needs Me?
5 minutes — Debriefing
15 minutes — Journal
10 minutes — Closing

2 hours total

Materials

You will need student journals. A teacher and teaching assistants are needed to comfortably conduct this lesson.

Suggested Quote/Cita sugerida

The following quote or one of your choosing, may be useful to initiate or continue discussions about ideas that are important in this unit and these lessons.

I change myself, I change the world.

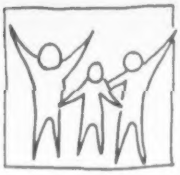
— Gloria Anzaldúa, as quoted in *The Fire in Our Souls*

Ms. Anzaldúa is co-author of *This Bridge Called My Back, Borderlands: The New Mestiza,* and most recently, the children's story "The Ghost Woman's Gift."

Me cambio a mi misma(o), y cambio el mundo.

— Gloria Anzaldúa

SESSION PLAN

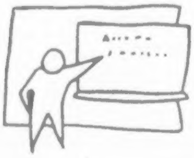


Welcoming (10 minutes)

Welcome students and take attendance. Review the concepts introduced in Lessons 28 and 29. Ask students what they think would happen if there wasn't enough food in an ecosystem. If you refer to the "Tangled Web" activity from the previous lesson, you can ask what would happen if one of those elements suddenly disappeared from the ecosystem (for example, algae). Many animals, as they saw, depend on algae as food. What would happen to those animals?

Homework/Learning Options (45 minutes)

Students should use this time to complete any homework assignments, engage in free reading, or receive individualized tutoring.



Curriculum

Discussion (10 minutes)

Continue the line of discussion you initiated in the opening session. Expand on this topic by asking students to recall the five basic essentials needed by both people and animals. [Food, shelter, air, space, water.] Then, ask students if they think that an ***ecosystem** can provide all of these things. [Yes.] Tell them that, although the previous lesson explored a wetland ecosystem, there are many other types of ecosystems. Ask them if they can name other ecosystems. [Oceans, puddles, ponds, forests, cities, marshes, countrysides, etc.] Tell them that even the leaf of a plant can be an ecosystem for some animals.

Tell students:

"There are many different kinds of ecosystems, and as long as the environment provides the five basic essentials of all living things — water, food, air, shelter, and space — it can be considered an ***ecosystem**. As a matter of fact, a leaf can be considered an ecosystem. There is an insect called an aphid. It lives on the surface of a leaf and depends on this leaf for its food. This leaf also provides this insect with all of its other needs."

Dígale a los alumnos:

"Hay muchos tipos diferentes de ecosistemas, y mientras que un ambiente provea las cinco necesidades básicas para los seres vivientes — agua, alimento, aire, resguardo y espacio — se considera este ambiente como un ***ecosistema**. En realidad, hasta una hoja puede ser un ecosistema. Hay unos insectos llamados áfidos, que viven en la hoja y dependen de ella para su alimentación. Además, esta hoja le da a este insecto todo lo que necesita".

Inform students that today they will be playing a game, in which each student will pretend to be an important part of an ecosystem.

Who Needs Me? (25 minutes)

This activity requires a lot of space and can be done outdoors, if weather permits. The students will be divided into four groups. If the class is already divided into four cooperative learning teams, you can use the same system. If not, have students number off from one to four, and have the groups (the group of number ones, number twos, etc.) gather in different parts of the room. Give each of the four groups the following roles to play and the symbols they will use to identify themselves during this activity:

Group Number One:

Deer - create horns on your head by placing two fingers from each hand on the top of your head.

Group Number Two:

Water - place both hands over your mouth.

Group Number Three:

Food - place both hands on your stomach.

Group Number Four:

Shelter - place both your hands flat on top of your head.

Demonstrate these hand signals to the entire class, and before proceeding, make sure that every student can identify a deer, water, food, and shelter based on these symbols. Next, divide the "deer" from the rest of the students. One side of the room or a certain space outdoors, should be identified as the "deer area." Water, food, or shelter cannot move to this side of the room or into this area until they have been identified by a deer.

Next, tell students that each deer needs to obtain either water, food, or shelter to survive. Although a deer needs all four, each "deer" must decide which basic need it will go after. Have all the "deer" turn their backs to the rest of the students, and decide which essential element they're going to pursue. After the "deer" decide which basic need they will pursue, they should turn around and move one hand from their heads to make the symbol of that essential element. For example, if a "deer" decides to pursue water the student should place one hand on top of his/her head, symbolizing horns, and the other hand should cover his/her mouth, symbolizing water.

When the students are given the signal, all the "deer" will try to find the basic needs they are looking for. The deer can no longer return to the "deer area" until they capture the essential element they are pursuing. If a "deer" is unable to find water, food, or shelter, it dies and becomes that basic need. In other words, the student is no longer a deer, but becomes either water, food, or shelter depending on what s/he was searching for.

If a "deer" successfully makes a match (if it finds the food, water, or shelter it was pursuing), it brings that essential element back to the deer area. The "deer," if it is successful, can reproduce. Therefore, the student that initially represented food, water, or shelter now becomes a "deer."

The students portraying food, water, and shelter who were not chosen by a "deer," return to their side of the room, and remain as these basic needs until chosen by a "deer." Continue the game for several rounds. After each round it should become quite clear that, if there are too many deer, there is not enough food, water, or shelter. In addition, there have to be enough of all of these essentials for all the deer to survive. Each round should only take a few minutes. You may want to put a time limit on each round, or wait until it becomes clear that some students will not be able to match up with others.

Provide students with the following instructions:

"When I give the signal, each one of you will make your symbol, and the 'deer' will decide what it needs; either food, water or shelter. The 'deer' will put one of its hands on either its mouth, stomach or on top of its head. The other hand remains as horns on your head. When I give the second signal, the 'deer' that needs water will try to match up with the water, the 'deer' that needs food will try to find food, and the 'deer' that needs shelter will try to find shelter. No talking is necessary: remember deer don't communicate using words. If you are a 'deer,' you cannot change what you are looking for once you have decided. If you are chosen by a 'deer,' then you and the 'deer' will return to the 'deer' part of the room. If you are a 'deer' and cannot find the food, water, or shelter you are looking for, then you cannot return to the 'deer' part of the room. This means that you do not survive, and you now become the basic need you were looking for — you either become food, water or shelter, depending on which one of these you were looking for, and you need to use that new symbol."

"Those 'deer' that made it back to the 'deer' part of the room with their chosen basic need can reproduce or have a baby deer (fawn). The food, water, or shelter you brought back with you turns into a baby deer (fawn). After every one determines what they are after the first round, we start the game again. When I give the signal, each deer will again decide what it needs (either food, water, or shelter), and when I give the second signal, it will try to find that essential element."

Digale a los alumnos:

"Cuando dé la señal, cada uno de ustedes hará su simbolo, y los 'venados' van a decidir lo que necesitan — alimento, agua o resguardo. El 'venado' pondrá una mano sobre su boca, estómago o cabeza, según la necesidad que haya escogido. Cuando dé la segunda señal, el 'venado' que necesite agua tratará de juntarse con el agua, el 'venado' que necesite resguardo tratará de juntarse con el resguardo, etc. No deben hablar durante esta actividad (los venados no hablan para comunicarse)".

"Si eres un 'venado', una vez que hayas decidido lo que vas a buscar, ya no puedes cambiar. Si un 'venado' te está buscando y te escoge, regresarás con el 'venado' al 'área de venados'. Si eres 'venado' y no puedes encontrar lo que buscas, no puedes regresar a esa parte del salón. Como no puedes sobrevivir, ahora el venado se convierte en lo que buscaba — agua, alimento o resguardo. Ahora usarás el nuevo símbolo. Los 'venados' que regresaron con su necesidad básica al 'área de venados', como sobrevivieron, ahora se podrán reproducir. El alimento, agua o resguardo que regrese a su área con un 'venado' se convierte en 'venado' y cambia de símbolo. Despúes que todos hayan escogido su papel, empezaremos el juego de nuevo, cada quien en su nuevo papel y con su símbolo nuevo".

Debriefing (5 minutes)

Allow a few minutes for students to discuss what happened in the game. Ask them following questions:

- Was there enough food, water, and shelter for all of the deer?
- Do you think there was balance in our game?
- What happened (or could have happened) when there were more deer than resources?

Pregunte a los alumnos:

- ☆ ¿Hubo bastante comida, agua, y resguardo para cada venado?
- ☆ ¿Creen que hubo un equilibrio en nuestro juego?
- ☆ ¿Qué pasó (o podría haber pasado) cuando hubieron más venados que recursos?

Journal (15 minutes)

Ask students to record the day's activity in their journal. In particular, ask them to address what they learned through the activity. They can accompany their journal entry with a drawing of some aspect of the game.

Closing (10 minutes)

Thank students for their good work today. Ask them how they would tell a friend who is not in the Academia about today's activity. If time permits, allow a few children to read from their journal entries and, if they did not have a chance to earlier, allow a few of them to present the report they produced as part of the Parent Link in Lessons 28 and 29.

Parent Link

In a Few Square Inches. Families will need materials for this Parent Link activity: an empty picture frame (i.e., the wooden frame part of it alone), and a magnifying lens. Parents and students are to pick an interesting outdoor area, such as a patch of grass or weeds. (This can be in back of the house or at a nearby park.) They should lay the picture frame on the ground to frame the area they have chosen to observe. Using the magnifying lens, they will examine this mini-environment. Ask them to watch for interesting insects, plant life, and soil features. How do insects interact with one another? With plants? With the soil? This is an excellent opportunity for families to record their observations in their family nature journals they used previously in this curriculum.

Enlace familiar

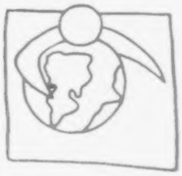
En un cuadro pequeño. Las familias necesitarán materiales para la actividad de enlace familiar: Un marco de porta retrato vacio (solamente la parte del marco) y una lupa. Los padres y alumnos pueden escoger un lugar interesante que tenga pasto o hierba. (Esto se puede hacer en la parte de atrás de la casa o un parque cercano). Deben poner el marco del porta retrato en el suelo para enmarcar el área que ellos escogieron para observar. Usando la lupa, examinaran este pequeño medio ambiente. Pídales que estén atentos para observar insectos interesantes, la vida vegetal, y las características de la tierra. ¿Cómo interactuan los insectos entre sí, con las plantas y con la tierra? Esta es una oportunidad excelente para que las familias anoten sus observaciones en su diario familiar de la naturaleza que usaron previamente en Academia.

Literature Link

The following books provide students with an excellent introduction to various types of ecosystems: *One Day in the Tropical Rainforest*, and *One Day in the Woods*, by Jean C. George; and *Sierra* by Diane Siebert. These books are recommended for grades 4 and up.

Lesson 31

How Can We Help?
¿Cómo podemos ayudar?



Overview

In this lesson, students work in their cooperative learning teams at work stations. At one station, they initiate a recycling project that will continue through the end of the year. At another, they are given the opportunity to create a "Circle Poem of Praise" to address some of the concepts they have learned, and to understand how differing "world views" impact our relationship with our natural environment. In addition, a papermaking project allows students to experience, first-hand, some of the joys and rewards of recycling.

Resumen

En esta lección los estudiantes trabajan con sus grupos de aprendizaje cooperativo en los centros de trabajo. En uno de los centros de trabajo empiezan un projecto de reciclaje que continuará hasta el final del año escolar. En otro centro de trabajo se les va a dar la oportunidad de crear un "Poema de alabanza en círculo" para aplicar algunos conceptos que aprendieron, y comprender cómo "la forma de ver el mundo" impacta nuestra relación con el medio ambiente. Como un proyecto adicional los estudiantes producirán hojas de papel. Este proyecto le permitirá disfrutar de los beneficios que se obtienen del reciclaje.

Key Skills

Listening
Comprehension
Analysis
Applying information
Writing
Charting
Problem-Solving
Working cooperatively

Destrezas claves

Escuchar

Comprender

Analizar

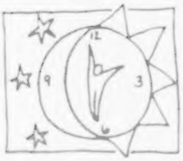
Aplicar información

Escribir

Hacer gráficas

Resolver problemas

Trabajar cooperativamente



Suggested Time

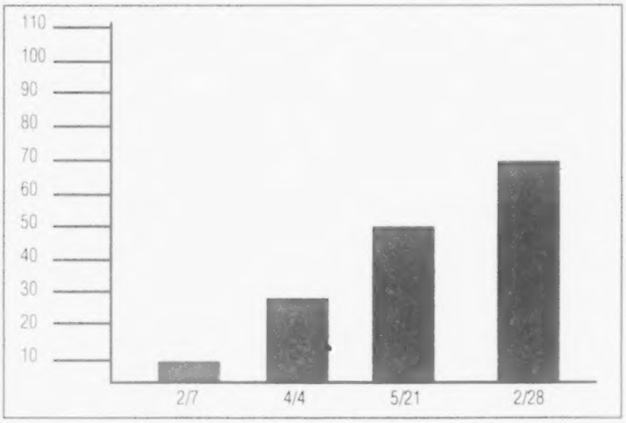
10 minutes — Welcoming
45 minutes — Homework/Learning Options
20 minutes — Work Station I: "Circle Poem of Praise..."
20 minutes — Work Station II: The Recycling Project
20 minutes — Work Station III: *Nuestro mundo creativo*
5 minutes — Closing

2 hours total

Preplanning

1. Review the procedures and rules for work stations with teaching assistants, assign teaching assistants to work stations, and make sure each one knows his/her responsibilities.
2. Review instructions for Work Station I and the poems included as Handouts 31.1 and 31.2. Contact the organizations mentioned in the instructions for this work station (these appear in the bibliography section of this curriculum), or visit a local children's museum store, hobby or arts and crafts shop to acquire wildlife stickers, if you choose to use them as part of this activity. If you plan for this activity well in advance, you may be able to ask your students to begin collecting and contribute their own stickers. These can be accumulated over a period of time in small manila envelopes kept at Academia for future use.
3. Prepare a "Class Recycling Contributions" chart. An example of this chart is provided in Figure 1 below. This chart will be used to record the number of aluminum cans brought in by the students of Academia. At the end of the year, the cans should be recycled and "cashed in." The money collected from the cans may be put to any use the whole class decides upon (an end-of-the-year party, for example).

Figure 1



4. Gather information about aluminum recycling facilities in or near your neighborhood. Make logistical plans for the recycling project. Where will you store the cans? Who will take them to the recycling center? How often? Who will take charge of the money? How will you let parents know about the project?
5. Gather materials needed for the papermaking project in Work Station III. You can purchase deckles and moulds rather inexpensively at a hobby or arts and crafts shop. Deckles and moulds are rather easy to build, too. You can have someone with experience help you learn to build one rather easily. An alternative would be to use a simple homemade mould and deckle, though you will have to give up making square sheets. To make your own homemade mould and deckle, obtain an embroidery hoop. Stretch fine, rust-proof screening (available at hardware stores) over the first hoop (the hoop comes as a set of two hoops, one that fits neatly inside the other). You can use the second hoop as a deckle. Embroidery hoops can be purchased at any fabric or large department store. Of course, you can also buy papermaking kits that come with everything you will need for this kind of activity. We strongly recommend Paper Anew™, whose simple instructions and creative ideas we have followed here. (Please refer to "Resources.")
6. Plan well ahead to secure all the paper you will need to recycle your pulp.
7. Review the papermaking terms included as Handout 31.3. (With time constraints, it might prove easier to review these at the end of the previous lesson as a way to inspire students and introduce them to this project. This can also be used as a time to briefly go over logistics. You might also ask students to consider adding some of these terms to their wordbanks.) Consider enlisting the help of your students and teaching assistant(s) in gathering an assortment of the decorations you will need that are listed in the materials section under

Work Station III. Have every one bring in a different type of decoration: ask students to bring enough for one small group.

8. As with any other construction activity please be sure to try the papermaking project on your own first.

Materials

A teacher and teaching assistants are needed to fully implement this lesson. You will also need the following materials:

At Work Station I:

- ☆ Wildlife stickers, 2-3 per student (whether or not you'll be doing collaborative pieces).
- ☆ Copies of Handout 31.1 and 31.2.
- ☆ Newsprint (or large pieces of paper), markers, and pencil.

At Work Station II:

- ☆ Chart paper, pencils, and markers.

At Work Station III:

- ☆ Deckle and mould, two each per cooperative team.
- ☆ Two sponges.
- ☆ Two small dishes.
- ☆ Decorations, any of these can be added to pulp mixture for texture: spices, wildflowers, autumn leaves, cut up reeds, sawdust, flower petals, pine needles, ferns, seeds (old packaged seeds), grass, herbs, parsley, potpourri, tinsel, hole punches.
- ☆ Two rustproof vats or dish pans.
- ☆ Old towels or stacks of newspaper.
- ☆ Old bed sheets, torn or cut into pieces 1" to 2" larger than the size of your mould and deckle.
- ☆ Used paper: junk mail, newspapers, grocery bags, lunch bags, egg cartons, Christmas wrap, phone books, tea bags, coffee filters, greeting cards, construction paper, computer paper, fruit or vegetable containers, water color paper, envelopes (after removing the glassine windows).
- ☆ Colors: it is best to start with colored paper (or to use food coloring if most of the paper you'll be recycling is white or a lighter color); used construction paper is an excellent way to create bright handmade papers.
- ☆ One (preferably 2) blenders, if you intend to make the pulp at Academia (we suggest you make most of the pulp ahead of time, as indicated in the instructions under this work station, and save a minimal amount to demonstrate the process in front of your students).

Suggested Quote/Cita sugerida

The following quote or one of your choosing, may be useful to initiate or continue discussions about ideas that are important in this unit and these lessons.

I change myself, I change the world.

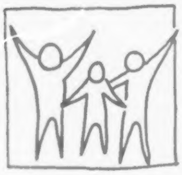
— Gloria Anzaldúa, as quoted in *The Fire in Our Souls*

Ms. Anzaldúa is co-author of *This Bridge Called My Back*, *Borderlands: The New Mestiza*, and most recently, the children's story "The Ghost Woman's Gift."

Me cambio a mi misma(o), y cambio el mundo.

— Gloria Anzaldúa

SESSION PLAN

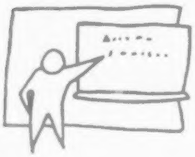


Welcoming (10 minutes)

Welcome students and take attendance. Tell them that today they will be working in their cooperative learning teams at work stations. Go over rules and procedures you feel may need review.

Homework/Learning Options (45 minutes)

Students should use this time to complete any homework assignments, engage in free reading, or receive individualized tutoring.



Curriculum

Work Stations (1 hour; 20 minutes at each station)

Work Station I: "Circle Poem of Praise in the Native American Spirit"

The Margot Fortunato Galt exercise that follows in this work station was adapted from an article in which it first appeared in *Teachers & Writers Collaborative*. It was, in that publication, adapted from Galt's book, *The Story in History*.

Through the exercise at this work station, students are introduced to the differing attitudes and customs of Native Americans and Europeans, and to the meaning of "world view." When the latter is addressed at this work station, please be sure to connect it to the guided discussion that took place toward the end of Lesson 29. [For example, *Why are bacteria and nutrients continually placed at the end of the food chain?*]

Step One: "First Model Poem"

Ms. Galt has her students read a "model poem" (i.e., one that is used as a successful example of the exercise) written by Darrel Daniel St. Clair of the Tlingit tribe. When Darrel, who was born in Alaska, wrote this poem he was a teenager and was speaking of a "school without walls." The poem appears as Handout 31.1, so that students can follow your reading or read along.

Step Two: "Stickers and Circles"

Briefly discuss how Darrel's school might be different than your students' school. Hand out wildlife stickers to each cooperative team member. (Ms. Galt suggests using stickers showing trees, birds, and other animals from organizations like the Sierra Club, the National Wildlife Federation and

Greenpeace. Refer to bibliographies for information.) Now, hand out big sheets of newsprint and ask students to fold them in half. Have them draw a medium-sized circle on one half of the paper, asking them to leave enough room to write on either half. Tell students to stick the sticker somewhere on the circle. This step is optional, but Ms. Galt herself recommends it strongly for younger students since it helps them to begin thinking about what they know (and have been recently learning at Academia) about the outdoors.

Step Three: "Two World Views"

Next, to illustrate two ways of looking at the world — the Native American way and the way of people with European ancestry — draw a pyramid and a circle on the chalkboard or newsprint. Tell students how the Native American way sees the world as a circle in which humans occupy a place, the same, exact way everything else does in the natural world (like rivers and beavers and mountain lions and cardinals and meadows and dandelions and creeks and oceans, and so on). As you give these examples, write them around the circle you've made on the board or chart paper. Next, share with students in your own words, the information contained in Ms. Galt's following passage:

> ...Although humans may kill animals and plants for food, humans belong to the circle, too, and must also learn from everything else in it. In other words, we are neither better than, nor separate from, the other life forms in the circle.
>
> The European way tends to see the world as a pyramid, with a supreme divinity at the top. Further down the pyramid are angels and then humans, after which come other living things, ranked according to their smartness or complexity or similarity to us. Students quickly grasp this concept, and can soon say that apes and monkeys should come under humans, then dogs and cats and hoofed animals, then other mammals, then birds and fish, then insects, then trees, then plants, then maybe water, maybe fire, maybe air, maybe dirt. The reasoning goes this way: as we descend lower on the pyramid, the things we add have "less life" and "less importance" — it is all right for humans to use them because these things can't feel anything and don't have a spiritual life.

Step Four: "Writing Nature into the Circle"

Next, have students add any forms of natural life they want to their circles. You can help them brainstorm by listing categories on the board: "Animals," "Plants," "Fish," "Weather," "Sky and What's in It," "Water," "Landscape," etc. Please have students be as specific as possible in their lists. For example, to jot down "eel" instead of "fish," and "crow" instead of "bird."

Step Five: "Second Model"

N. Scott Momaday is a well known contemporary Native American writer from the Kiowa tribe that originated in Montana and migrated to Oklahoma.

His poem, "The Delight Song of Tsoai-Talee," is included here as Handout 31.2. It speaks to the connection that all humans share to the bounty of their "earth mother." Ms. Galt recommends that you "ask the class to notice how precisely each description brings to life what Momaday has noticed... talk about what it means to 'stand in good relation.' Students often suggest that relation means relatives and good relation means treating relatives kindly and respectfully. I tell them that this poem is a love song, of course, not just to the daughter of Tsen-tainte, but to the whole world."

Step Six: "Poems about Nature's Teaching"

Tell the class that they will now write their own "song of good relation." In the poems they will write, one part of the circle will teach something to another part. They can begin by connecting two names in their circles with a straight line, like beaver and moon. You can use Ms. Galt's example to get them started, or come up with your own: "The wet, brown beaver leaps in the stream and shows the sad sliver of moon how to fill with rain." Write the first line of the poem on the board.

Next, if the students are older, have them brainstorm alternative words for "teach," like "preach," "demonstrate," "educate," "show," "learn," "understand," etc. Next, on the other half of the paper beside the circles, have students begin to draft their poems (if you are having them do individual pieces). Have them make each stanza a "take off" from the connection they've drawn between two parts of the circle. To illustrate this, below is a poem of a fourth grade student of Ms. Galt's:

The goat teaches
    the mountain how to sing.
The moon told
    the people how to be quiet.
The old woman made
    the elm tree come alive
    and he liked that.
The hail was in the sky, so
    he told the star to come, too.
The deer told
    the old man, "I like you."
The goat got shaped
    like a cloud because
he looked at it.

If you prefer for students to create a collaborative poem rather than individual pieces, have each student in the cooperative group write down two or three lines of their own, and take the best one or two lines from each student to create a group "circle poem." In the words of Ms. Galt, "like the circle diagram itself, these poems circle around and around in an endless chain of influence."

Be sure to post poems around the room when students are done, and to bring copies to your next Parents as Partners session.

Centro de trabajo 1: "Un poema de alabanza en círculo en el espíritu nativo americano"

El ejercicio de Margot Fortunato Galt, a continuación en este centro de trabajo, fue adaptado de un artículo de *Teachers and Writers Collaborative* en el cual este apareció primero. Fue en esta publicación donde se adoptó de *The Story in History* del libro de Galt.

Por medio de este ejercicio en este centro de trabajo se introduce a los estudiantes los distintos comportamientos y costumbres de los indios nativo americanos y de los europeos y del significado de la "forma de ver el mundo". Cuando este último se menciona en esta estación de trabajo, por favor asegúrese de conectar este con la discusión dirigida que se llevó acabo al final de la Lección 29. [Por ejemplo, "¿porqué la bacteria y los nutrientes son colocados continuamente al final de la cadena alimenticia?"]

Primer paso: "Primer ejemplo de poema"

La señora Galt hizo leer a sus estudiantes un modelo (un poema que se usó con éxito como ejemplo del ejercicio) escrito por Darrel Daniel St. Clair de la tribu Tlingit. Cuando Darrel, nativo de Alaska, escribió su poema era un adolescente y estuvo hablando de una "escuela sin paredes". El poema aparece como la Hoja de trabajo 31.1, de esta manera los estudiantes pueden seguir su lectura o pueden leer solos.

Segundo paso: "Etiquetas adhesivas y círculos" (Opcional)

Discuta brevemente cómo la escuela de Darrel puede ser diferente a la escuela de sus estudiantes. Déles etiquetas adhesivas que contengan dibujos de fauna a cada miembro del grupo cooperativo. (La señora Galt sugiere usar etiquetas adhesivas que muestren árboles, pájaros, y otros animales de organizaciones como el Club Sierra, el National Wildlife Federation y Greenpeace. Refiérase a la bibliografía para obtener más información). Provea a los alumnos con hojas de papel sábana grandes (newsprints) y pídale que las doblen por la mitad. Pida que dibujen un círculo mediano en una de las mitades de la hoja y que dejen suficiente espacio para escribir en la otra mitad de la hoja. Ahora pídales que peguen la etiqueta adhesiva en algún lugar del círculo. Este paso es opcional pero la señora Galt lo recomienda firmemente para estudiantes de grados inferiores ya que esto les ayuda a pensar acerca de lo que ya saben (y han aprendido recientemente en Academia) del mundo natural.

Tercer paso: "Dos formas de ver el mundo"

Luego, para ilustrar dos formas diferentes de ver el mundo — la forma de ver de los nativos americanos y la de la gente con descendencia europea — dibuje una pirámide y un círculo en la pizarra o en el papel de sábana grande. Diga a los estudiantes que los indios nativo americanos ven el mundo como un círculo en el cual los seres humanos ocupan un lugar, un lugar igual al que las demás cosas en el mundo natural (cómo los rios y los castores, los leones montañeses y los cardinales, las praderas y los dientes de león, los riachuelos y los océanos y demás) ocupan. A manera que va dando estos ejemplos, escríbalos alrededor del círculo que ha dibujado en la pizarra o el papel sábana grande. Luego, comparta con los estudiantes en sus propias palabras la información contenida en el siguiente pasaje de la señora Galt.

> ...Aunque los seres humanos matan animales y plantas para utilizarlos como comida, los seres humanos pertenecen al círculo también y tienen que aprender de todo lo que incluye el círculo. En otras palabras no somos mejores que los demás ni podemos separarnos de las otras formas de vida del círculo. Los europeos tienden a ver el mundo en forma de una pirámide con una divinidad suprema en la punta. Más abajo de la pirámide están los ángeles y luego los seres humanos, despúes de los cuales vienen otros seres vivientes, categorizados de acuerdo a su inteligencia, complejidad o su similaridad con nosotros. Los estudiantes comprenden rápidamente este concepto y prontamente pueden decir que los simios y los monos deben estar colocados debajo de los seres humanos, luego los perros, gatos, animales con pezuña, después otros mamíferos, luego vienen los pájaros, peces y después los insectos; a estos le siguen los árboles, plantas, luego tal vez viene el agua, fuego, aire y la tierra. El razonamiento se interpreta de la siguiente manera: A manera que se desciende la pirámide, las cosas que añadimos tienen "menos vida" y "menos importancia" — es aceptable que los seres humanos usen estas cosas porque estas no sienten nada y no tienen una vida espiritual.

Cuarto paso: "Incluyendo la naturaleza dentro del círculo"

Luego pida a los alumnos que añadan a sus círculos cualquier forma de vida natural que quieran. Usted puede ayudarlos a pensar haciendo una lista de categorias en la pizarra: "animales", "plantas", "peces", "tiempo", "el cielo y lo que hay en el", "agua", "paisaje", etc. Por favor pida a los estudiantes que sean muy específicos con sus listas. Por ejemplo, que anoten "anguila" en lugar de "pez"; "cuervo" en lugar de "pájaro".

Quinto paso: "Segundo ejemplo"

N. Scott Momaday es un escritor contemporáneo, indio nativo americano de la tribu de Kiowa (oriunda de Montana y emigrada a Oklahoma). Su poema titulado "The Delight Song of Tsoai-Talee" se incluye en esta lección como la Hoja de trabajo 31.2. Este poema habla sobre la conección que comparten los seres humanos con la generosidad de la madre tierra. La señora Galt recomienda que "los estudiantes se fijen en como la precisión de cada una de las descripciones le dan vida a lo que Momaday ha observado... discuta el significado de lo que es 'estar en buena relación con lo que nos rodea'. Los estudiantes sugieren frecuentemente que esta relación significa 'parientes' y que 'buena relación' significa tratar a los parientes amablemente y con respeto. Yo les digo que este poema es una canción de amor, por supuesto, no solamente para la hija de Tsen-tainte, más bien para todo el mundo".

Sexto paso: "Poemas acerca de las enseñanzas de la naturaleza"

Diga a la clase que ahora van a escribir su propia canción acerca de una buena relación. En los poemas ellos escribirán lo que una parte del círculo le enseñará a otra parte del círculo. Pueden empezar conectando dos nombres en sus círculos con una línea recta, como por ejemplo el castor con la luna. Puede usar el ejemplo de la señora Galt para que ellos empiezen, o puede usar su propio ejemplo y escribir la primera línea del poema en la pizarra: "El castor café mojado salta en el arroyo y le muestra al triste trozito de luna como llenarse de lluvia".

Después si los estudiantes son de grados superiores, pídales que piensen en palabras alternativas para "enseñar", como "predicar", "demostrar", "educar", "mostrar", "aprender", "comprender", etc. Después, en la otra mitad del papel al lado de los círculos, los alumnos deben comenzar a escribir sus poemas (si usted les pidió hacer piezas individuales). Pídale a los estudiantes que utilizen como punto de partida en cada estrofa la conección que han dibujado entre las dos partes del círculo. Para ilustrar esto a continuación tenemos un ejemplo del poema escrito por un alumno de cuarto grado de la señora Galt:

La cabra enseña
    a la montaña cómo cantar.
La luna le dice
    a la gente cómo estar callado.
La mujer vieja hizo
    que el árbol de olmo tomara vida
    y a el le gustó eso.
El granizo estaba en el cielo, entonces
    el le dijo a la estrella que viniera también.

El venado le dijo
    al hombre viejo, "Tú me gustas".
La cabra tomó la figura
    de una nube porque
ella le miró.

Si usted prefiere que los estudiantes creen un poema en colaboración en vez de piezas individuales, pida a cada estudiante en el grupo cooperativo que escriba sus propias dos o tres líneas y que escoga la mejor línea o dos de cada estudiante para crear un "poema en círculo" a base de grupo. En las proprias palabras de la señora Galt, "Como el diagrama del círculo, estos poemas dan vueltas alrededor como cadenas interminables de influencia".

Asegúrese de colocar los poemas alrededor del salón de clases cuando los estudiantes terminen y lleve copias a la próxima reunión de padres.

Work Station II: The Recycling Project

At this workstation, students will design a graph to record contributions made by their cooperative learning team to the class recycling project. They will begin this project by creating a chart similar to the ones they used to record attendance and weather. The teacher or teaching assistant at this station will tell the students that the entire class will begin a recycling project. Each team will have its own chart to record how many aluminum cans were collected. The team will record these contributions every other lesson, or about once a week. In addition, the class will have a chart that records the number of cans the whole class — all the teams — collect.

After explaining the project to the students at this work station, allow them to "brainstorm" a design. Students should then work together to create this chart. Remind them that the chart should have their group name on it, and it should be labeled well. It may tell you how many aluminum cans had been collected on any given date, and the total collected over the course of time, or the number of cans contributed by individual team members. However, be careful not to create charts that would stigmatize any team members who cannot participate in the project. The teacher or teaching assistant at this station should provide guidance and encouragement. Refer to Figure 1 for possible examples.

Centro de trabajo 2: El proyecto de reciclaje

En este centro de trabajo los estudiantes diseñarán una gráfica para registrar las contribuciones hechas por el grupo de aprendizaje cooperativo para el proyecto

de reciclaje de la clase. Los estudiantes empezarán este proyecto al crear un cuadro similar al que usaron en el projecto para registrar la asistencia y la temperatura del medio ambiente. El maestro o el asistente en este centro de trabajo les dirá a los estudiantes que toda la clase comenzará un proyecto de reciclaje. Cada grupo tendrá su propia gráfica para registrar la cantidad de latas de aluminio que se colectarón. El equipo va a registrar estas contribuciones cada otra lección o una vez a la semana. En adición, la clase tendrá una gráfica que registrará el número de latas que toda la clase — o sea, todos los grupos — coleccionó.

Después de explicar el proyecto a los estudiantes en este centro de trabajo permita que ellos "piensen" en un diseño. Los estudiantes deben trabajar juntos para crear esta gráfica. Recuérdeles que su gráfica debe llavar el nombre del grupo y debe estar bién rotulada. Esta debe mostrarle la cantidad de latas de aluminio que se han colectado en cierto día y la colección total en el curso de un tiempo o el número de latas que contribuyó cada miembro del grupo. De cualquier manera, tenga cuidado de no crear gráficas que puedan estigmatizar a algún miembro del grupo. El maestro o el asistente en esta estación debe proveer asesoramiento e incentivo. Refiérase a la figura 1 para ver algunos ejemplos.

Workstation III: *Nuestro mundo creativo*: Sheet Papermaking

Making your own paper brings you closer to the bounties of the natural world, and helps you develop an appreciation for and knowledge of the recycling process. Students are less apt to take waste and recycling for granted when they experience hands-on activities like this one.

At this station, students will recycle typical household (and/or school and work) waste paper into beautiful sheets they can use to write a letter or notes, to use for collage-making, or to make paper sculptures. Divide your cooperative learning team at the work station into two small groups (for a class of 30, there should be 5-7 students in each smaller group). Distribute materials, and assign one deckle and mould per small group. You may want to have your students observe first while you or a teaching assistant demonstrate the following steps. Afterwards, they can follow along. To prevent accidents, DO NOT allow students to operate blenders at any time. If you intend to make the bulk of the pulp at Academia, DO NOT leave blenders unattended at any time. Basic instructions for making sheet paper follow:

1. Fill vat ½ full with warm water. (Cool water will work, warm water just feels better.)
2. Fill blender ¾ full with water.
3. Add 1-2 handfuls of torn, used paper to blender.

4. Blend 1-2 minutes at high speed until a smooth mixture (called a "slurry") is created.
5. Pour slurry from blender to vat.
6. Repeat steps 2-5 until vat is about full. Gently stir water by hand to mix the pulp well. The thicker the mixture, the heavier the piece of paper you will create. The thinner the mixture, the more delicate the piece of paper will be. Pulp mixture should be approximately 90% water and 10% pulp.
7. Add confetti, leaves, petals or other decorations. Stir gently until evenly dispersed.
8. Hold mould screen side up. Place deckle on top and hold firmly, one hand on each side. Dip the edge of the mould and deckle into the vat at the side closest to you. Using a scooping motion away from you, capture the pulp on top of the mould screen.
9. Carefully lift the mould and deckle straight up, allowing excess water to drain through. Shake gently a few times for even dispersion of the fibers.
10. Rest corner of mould and deckle on one edge of vat. Lift off deckle and set aside.
11. To transfer or "couch" the pulp, turn mould upside down on a piece of sheeting that has been placed on an old folded towel. (Stacked newspaper can be substituted for old towels.) Sponge off excess water into small dish. Continue sponging until moisture is no longer noticeable.
12. To remove mould, hold corner of sheeting while lifting mould gently at same corner. Once that first edge is separated the rest will follow easily. As each sheet of paper is couched, you are now ready to make a new sheet. Repeat steps 7-11 until pulp can be added or remaining pulp can be strained for future use.
13. Let your newly-formed sheet of paper air dry on a sheet. Drying time will vary, but it generally takes several hours or overnight. Drying time can be shortened by drying in the sun or in warm area. (Exposure to extreme sun may cause bleaching, though.) Once dry, peel handmade paper away from sheeting, starting slowly at one corner.

Cleanup

1. Rinse blender and lid after last batch of pulp is mixed. Colored pulp can cause staining on plastic lids if not rinsed right away.
2. Strain left-over pulp at the end of each session. Do not pour pulp down drain as clogging may occur. To store, form pulp into little balls and allow to air dry. They are then ready for re-use by adding water and mixing with other pulp in another session. Pulp can also be kept in the refrigerator (in a covered container) for a week or two.

Some Cautions

- ☆ Be sure to use old towels. Colors from some junk mail and construction papers can transfer through cotton sheeting to towels.
- ☆ Occasionally, the ink from writing pens may spread into the paper fibers of a finished piece of handmade paper. This can be avoided by dissolving one of the following ingredients in a quart of water and adding it to your vat: 1 package of unflavored gelatin, or 1 tablespoon of cornstarch, or 1 tablespoon of liquid starch.
- ☆ When drying newly formed sheets of paper, don't place them on wood surfaces as warping of the wood may occur.
- ☆ The quality of the paper you start with will be the quality of the finished product. For example, construction paper will fade over time when exposed to sunlight, and so will handmade paper made from construction paper pulp. (Special dyes for pulp, and the chemicals to make them colorfast, are available but are often expensive.)

Some Suggestions

- ☆ Two fine sheets of wet paper can be laminated together. Make the first sheet. While it is still wet make another. Couch it right on top of your first sheet. (If you want to repeat this activity yourself and/or with your students in the future, try these variations: laminate two different colors or sizes together. Laminate objects, raffia, threads, or whatever you like between the sheets for texture.)
- ☆ If you try this at home yourself, you can achieve a smoother finish by pressing damp sheet paper with an iron set on medium heat and no steam.
- ☆ Damp sheet paper can be sculpted or folded. Add bits of raffia, foil, feathers, dried flowers, etc. for interesting effects. Handmade papers make excellent collages. Shells, buttons, ribbons, sticks, etc., can be used as trim if desired.
- ☆ Bottled scents can be added to vat for fragance. Experiment with quantity of drops to achieve the desired strength of scent. (Essential oils work best.)
- ☆ If you intend to try this activity again, either for yourself and/or with your students, keep samples and records of each paper as an excellent way to build upon your experience and duplicate your efforts in the future.
- ☆ Feel free to make larger sheets: don't be limited to the size of the mould and deckle you are using. Larger sheets can be formed by laminating two or more sheets together. Just lay two sheets side by side while wet, and overlap slightly. Using the screen and sponge, gently press the edges together to form a single large sheet.

Centro de trabajo 3: "Nuestro mundo creativo": Haciendo hojas de pápel

El producir nuestro propio papel nos acerca más a la generosidad del mundo natural y nos ayuda a apreciar el conocimiento que obtenemos del proceso de reciclaje. Los estudiantes son los menos aptos para tomar por sentados los desechos y el proceso de reciclaje después de experimentar una actividad como esta.

En esta estación los estudiantes reciclarán materiales típicos de reciclaje de un hogar (la escuela o el trabajo) y convertirán los desperdicios de papel en hojas de papel hermosos que pueden usar para escribir cartas o notas para hacer colage o hacer esculturas de papel. Divida su grupo cooperativo de aprendizaje en la estación de trabajo en dos grupos pequeños (deben haber 5 a 7 estudiantes en cada grupo). Distribuya materiales, y asigne un marco y sobremarco por grupo. Es buena idea que los estudiantes observen primero mientras usted demuestra los siguientes pasos. Después, los estudiantes pueden seguirle junto al asistente. Para prevenir accidentes, NO PERMITA que los estudiantes utilizen licuadoras en ningún momento. Y si tiene la intensión de hacer una cantidad grande de pulpa en la Academia, NO DEJE las licuadoras al alcanze de los niños en ningún momento. Las siguientes son las instrucciones básicas para hacer las hojas de papel:

1. Llene una vasija con agua tibia hasta la mitad. (El agua fria también funciona, pero la temperatura del agua tibia es más cómoda para usar)
2. Llene ¾ partes de la licuadora con agua.
3. Añada 1 o 2 manos llenas de pedazos de papel usado en la licuadora.
4. Licuee a alta velocidad por 1 o 2 minutos hasta que se forme una mezcla suave (llamada "lechada").
5. Eche la lechada de la licuadora en la vasija.
6. Repita los pasos 2 a 5 hasta que la vasija esté casi llena. Eche el agua suavemente para mezclar bien la pulpa. Mientras más espesa sea la mezcla, más gruesa le saldrá la hoja de papel. Mientras más líquida sea la mezcla, más fino saldrá el papel. La mezcla de la pulpa debe ser aproximadamente 90% de agua y 10% de pulpa.
7. Añada confeti, hojas, pétalos, u otras decoraciones. Mezcle todo hasta que los materiales se dispersen por igual.
8. Agarre el marco con la parte inferior hacia arriba. Coloque el sobre-marco encima del marco firmemente, con una mano a cada lado. Sumerja la barba de papel dentro de la vasija hacia los lados que estan más cerca hacia usted. Capture la pulpa encima de la malla del marco usando la forma del movimiento de un cucharón pero sin acercar la mezcla hacia usted.

9. Cuidadosamente levante el marco y sobre-marco hacia arriba, deje que el exceso de agua chorree bien. Agite suavemente unas cuantas veces para dispersar la fibra en partes iguales.
10. Deje reposar la esquina del marco y el sobre-marco en un borde de la vasija, remueva el sobre marco y póngalo a un lado.
11. Para transferir la pulpa, vuelque la parte de arriba del marco hacia abajo sobre un pedazo de sábana que ha sido colocada en una toalla vieja doblada. (El montón de papel puede sustituirse por toallas viejas). Extraiga el exceso de agua con una esponja y ponga en un recipiente pequeño. Continue sacando el agua hasta que la humedad no sea tan notable.
12. Para remover el marco agarre la esquina de la hoja mientras levanta el marco suavemente de la misma esquina. Una vez que la primera esquina este suelta el resto va a separarse fácilmente. A manera que cada hoja de papel sea curtida, usted estará listo(a) para hacer nuevas hojas de papel. Repita los pasos 7 a 11 hasta que la pulpa se pueda añadir o el resto de la pulpa se pueda guardar para usar en el futuro.
13. Deje la hoja de papel recién formada secar con el aire o sobre la sábana. El tiempo de secado va a variar pero generalmente toma varias horas o toda la noche. El tiempo de secado se puede reducir si se seca en el sol o en un área caliente. (Si se expone mucho al sol se puede banquear.) Una vez que esté seco, desprenda el papel de la sábana empezando por una esquina.

Limpieza

1. Enjuague la licuadora y la tapa después de mezclar la última porción de la pulpa. La pulpa teñida puede causar manchas en la tapa de plástico si no se lava inmediatamente.
2. Cuele la sobra de pulpa al terminar cada sesión. No eche la pulpa en el desaguadero porque puede tapar las cañerias. Para guardar la pulpa moldeela en forma de bolitas pequeñas y deje que se sequen al aire. Después estas estarán listas para usarse nuevamente con sólo añadirle agua y mezclarla con otra pulpa en otra sesión. La pulpa también se puede mantener en el refrigerador (en un recipiente cerrado) por una semana o dos.

Algunas precauciones

- ☆ Asegúrese de usar toallas viejas. El color del papel de propaganda que envian por correo y el papel de construcción puede traspasar las sábanas de algodón y manchar las toallas.
- ☆ Ocacionalmente la tinta de los lapiceros puede chorrear en las fibras del papel terminado y hecho a mano. Esto puede evitarse si disuelve uno de los siguientes ingredientes en un cuarto de galón de agua y se lo añade a su vasija: un paquete de gelatina sin sabor o una cucharada de maizena, o una cucharada de almidón líquido.

- ☆ Cuando esté secando hojas de papel recién hechas, no las ponga en una superficie de madera porque la madera se puede deformar o torcer.
- ☆ La calidad del papel terminado va a ser la misma que la del papel con que comenzó. Por ejemplo, el papel de construción se descolora al pasar el tiempo si se expone a los rayos del sol, entonces pasa los mismo con el papel de construción hecho a mano. (Existen tinturas especiales y químicos para la pulpa que hacen que el color no se destiña, o sea que sea fijo, pero usualmente son caros.)

Algunas sugerencias

- ☆ Las hojas finas de papel se pueden laminar juntas. Haga la primera hoja. Mientras está húmeda haga otra hoja. Curta directamente sobre su primera hoja. (Si usted desea repetir esta actividad sola o con sus estudiantes en el futuro trate las siguientes variaciones: lamine dos colores diferentes o tamaños juntos. Lamine objetos, rafia (planta y fibra) hilos, etc. entre las hojas para textura.)
- ☆ Para ayudar con el proceso de secamiento, cuando trate de hacer esto en la casa y lograr un terminado fino, presione el papel húmedo con una plancha a temperatura mediana sin vapor.
- ☆ Se puede esculpir o doblar una hoja de papel húmedo. Añada pedazos de rafia, pedazos de aluminio, plumas, flores secas, etc. para que tenga efectos interesantes. El papel hecho a mano es excelente para hacer colages. Se pueden usar conchas, botones, cintas, palos, etc. para adornar si gusta.
- ☆ También se puede añadir esencia para aumentar la fragancia. Experimente con la cantidad de gotas que necesita para lograr el olor que desea. (Las esencias aceitosas funcionan bien.)
- ☆ Si piensa hacer esta actividad nuevamente sola(o) o con sus alumnos, mantenga muestras y registros de cada papel, esta es una forma excelente de ganar experiencia y también le obliga a esforzarse más en el futuro.
- ☆ Haga hojas grandes. No se limite al tamaño del marco y al sobre-marco que está usando. Las hojas largas se pueden formar laminando dos o más hojas juntas. Coloque dos hojas de lado a lado mientras esten húmedas y sobreponganlas un poco para que se unan. Usando una pantalla y una esponja presione los bordes de las hojas suavemente para formar una hoja larga.

Closing (5 minutes)

In this closing session, have each team display their "circle poem(s) of praise" and their handmade paper. If time permits, allow students to discuss the differences between the Native American and the European world views. Have participation monitors show the class the "Class Recycling Contributions" chart their team prepared. Tell students that they will recycle

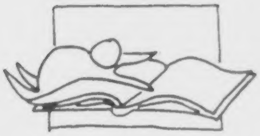
the cans and use the money they earn for a class treat at the end of the year. Finally, tell students that they will learn more about recycling in the next unit.

Parent Link

Have students share with parents what they learned about world views at Academia today. Have them ask parents about their own "world view" and how it compares to the ones they learned about today. What is the world view of the native peoples of the family's country of origin? Does the family incorporate this world view into how they see the world or live their lives today?

Enlace familiar

Pida a los estudiantes compartir con sus padres lo que aprendieron acerca de la forma de ver el mundo en la Academia hoy. Diga a los estudiantes que pregunten a sus padres acerca de sus puntos de vista del mundo y como se comparan estos con los que aprendieron hoy. ¿Cuál es el punto de vista de la gente nativa del pais original de su familia acerca del mundo? ¿La familia incorpora este punto de vista del mundo a como ellos ven el mundo o a la forma de vivir sus vidas hoy?



Literature Link

Paul Showers's *Where Does the Garbage Go?* takes students to a landfill to see how trash piles up, to an incinerator to see how garbage can be turned into energy, and to a recycling center to see how a soda bottle can be transformed into a flowerpot. This book is filled with graphs, charts and diagrams, explains how humans deal with excessive trash, and provides ideas for easy ways to be a part of the solution. Recommended for grades K-4.

Gail Gibbons' Recycle! *A Handbook for Kids* takes an insightful, behind-the-scenes look into the process of recycling and provides fascinating facts about garbage, as well as helpful hints that children can use to help clean up the environment. Recommended for grades pre-K-3.

Handout 31.1

A Poem by Darrel Daniel St. Clair*

My school is the earth.
My teachers,
The sky, the clouds, the sun, the moon,
The trees, the bushes, the grass,
The birds, the bears, the wolves,
The rivers, whom I claim to be
My mad genius.
Once I missed a day
Because they tried to make
Me learn it from the books
In a little room
That was really too stuffy.
I hope my teachers don't
Put me on the absent list.
I enjoy going to that school
Where the air is fresh.
Where nothing is said and I learn
From the sounds.
From the things I touch,
From all that I see.
Joy to the world and
I've fallen in love with my teachers.

---

* From "The Story in History," Margot Fortunato Galt, *Teachers and Writers Collaborative*.

Hoja de trabajo 31.1

Un poema de Darrel Daniel St. Clair*

Mi escuela es la tierra.
Mis maestros,
El cielo, las nubes, el sol, la luna,
Los árboles, los arbustos, el césped,
Los pájaros, los osos, los lobos,
Los rios, son a quienes les debo
Mi loco genio.
Una vez falté un día
Porque ellos trataron de hacerme
Aprender de los libros
En un aula pequeña
que era realmente oprimente.
Espero que mis maestros no me
Pongan en la lista de ausentes.
A mi me gusta ir a esa escuela, aquella
Donde el aire es fresco.
Donde no se dice nada y yo aprendo
De los sonidos.
De las cosas que toco,
De todas las cosas que veo.
Qué viva el mundo.
Yo me enamoro de mis maestros.

---

* De "The Story in History," Margot Fortunato Galt. Teachers and Writers Collaborative

Handout 31.2

"The Delight Song of Tsoai-Talee"*
by N. Scott Momaday

I am a feather on the bright sky
I am the blue horse that runs in the plain
I am the fish that rolls, shining, in the water
I am the shadow that follows a child
I am the evening light, the luster of meadows
I am an eagle playing with the wind
I am a cluster of bright bead
I am the farthest star
I am the cold of the dawn
I am the roaring of the rain
I am the glitter on the crust of the snow
I am the long track of the moon in a lake
I am a flame of four colors
I am a deer standing away in the dusk
I am a field of sumac and the pomme blanche
I am an angle of geese in the winter sky
I am the hunger of a young wolf
I am the whole dream of these things

You see, I am alive, I am alive
I stand in good relation to the earth
I stand in good relation to the gods
I stand in good relation to all that is beautiful
I stand in good relation to the daughter of Tsen-tainte
You see, I am alive, I am alive.

---

* From "The Story in History," Margot Fortunato Galt. *Teachers and Writers Collaborative*

Hoja de trabajo 31.2

"La canción deleitosa de Tsoai-Talee"*

por N. Scott Momaday

Yo soy una pluma en el cielo brillante
Yo soy el caballo azúl que corre en la llanura
Yo soy el pez que nada, brillando en el agua
Yo soy la sombra que persigue a un niño
Yo soy la luz de la noche, el resplandor de la pradera
Yo soy el cóndor que juega con el viento
Yo soy un grupo de cuencas brillantes
Yo soy la estrella más rápida
Yo soy el frio de la madrugada
Yo soy el rugido de la lluvia
Yo soy el brillo de la capa de nieve
Yo soy la senda larga de la luna en el lago
Yo soy la llama de cuatro colores
Yo soy el venado que está parado lejos en el atardecer
Yo soy un campo de zumaque y de la pomme blanche
Yo soy un ángulo de gansos en el cielo de invierno
Yo soy la comida de un lobo hambriento
Yo soy el sueño de todas estas cosas

Tú ves, yo estoy vivo, yo estoy vivo
Yo tengo una buena relación con la tierra
Yo tengo una buena relación con las cosas buenas
Yo tengo una buena relación con todo lo que es bello
Yo tengo una buena relación con la hija de Tsen-tainte
Tú ves, yo estoy vivo, yo estoy vivo.

---

* De "The Story in History." Margot Fortunato Galt. Teachers and Writers Collaborative

Handout 31.3

Papermaking Terms*

Couching	To transfer a newly-formed sheet of paper from the mould to another surface. Water is then removed from the paper with a sponge.
Deckle	A removable wooden frame that rests on the top of a mould and creates a deckle edge.
Deckle edge	The evenly-feathered edge that is the hallmark of fine handmade papers.
Felt	Cloth onto which paper is transfered, absorbing the excess water. Traditionally, felt is made of wool. Cotton sheeting and old towels are recommended as an inexpensive alternative.
Laminating	The process of fusing two wet sheets of paper together by couching.
Mould	A papermaking screen consisting of a wooden frame with wire or polyester mesh attached.
Pulp	Fibrous substance from which paper is made.
Sizing	A substance added to the pulp to decrease absorbency. Reduces or eliminates ink spread on finished sheet of paper.
Slurry	A mixture of pulp and water.
Vat	Rust-proof tub, usually plastic, in which slurry is placed. Needs to be larger than the mould and deckle you will use, and square.

---

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Hoja de trabajo 31.3

Vocabulario que se usa para hacer papel

Curtir	Es el proceso de trasferir un papel que recién se formó del marco a otra superficie. Luego se extrae el agua del papel con una esponja.
Sobre-marco	Un marco de madera movible que se coloca encima del marco para formar la barba de papel.
Barba de papel	El borde parejo que es típico del papel fino hecho a mano.
Fieltro	Es la tela sobre la cual se transfiere el papel y absorve el exceso de agua. Tradicionalmente, el fieltro es hecho de lana. Lencería de algodón y toallas viejas se recomiendan como una alternativa por su bajo costo.
Laminar	El proceso de unir dos hojas de papel mojadas por medio del proceso de curtir.
Marco	Una marco para hacer papel que consiste en un marco de madera con alambre o sujetada con una malla de poliester.
Pulpa	Una sustancia fibrosa del cual se fabrica el papel.
Absorbente	Una sustancia que se añade a la pulpa para decrecer la absorbencia. Reduce o elimina el esparcimiento de la tinta en una hoja de papel terminada.
Lechada	Una mezcla de pulpa y agua.
Vasija	Una bañera a prueba de sarro, usualmente de plástico, en el cual se coloca la mezcla. Tiene que ser más grande que el marco y el sobre-marco y ser cuadrada.

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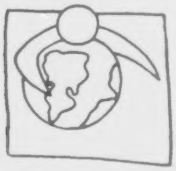
Lesson 32

At Home in Your Watershed (Part I)
¿Cómo es tu vertiente? (Parte I)



Overview

Students discover how they are connected to their environment and community through the identification of their ecological address. They explore watersheds, how they work, and what actions they can take to protect them. The activity presented in this lesson was developed by the National Science Foundation for National Science and Technology Week.

Resumen

Los alumnos descubren cómo están relacionados con su ambiente y su comunidad, al identificar su "dirección ecológica". Exploran las vertientes de agua, cómo funcionan, y qué pueden hacer para protegerlas. Esta actividad fue desarrollada por el National Science Foundation para la Semana Nacional de Ciencias y Tecnología.

Key Skills

Inferring
Using numbers
Planning
Measuring
Predicting

Destrezas claves

Hacer inferencias
Usar números
Planear
Medir
Hacer predicciones

Preplanning

1. Copy of Handouts 32.1, and 32.2.
2. Review "Background for the Teacher."
3. Review the following vocabulary:

* *watershed*	* *vertiente*
* *ecology*	* *ecología*

Background for the Teacher

If you could stand on the banks of a river and look upstream, you would be looking at the watershed of that river. The largest part of this watershed is land and not water. And almost everything that affects the ecological health of that river occurs on that land.

A river and its tributaries run through the watershed collecting waters that contain materials and contaminants that have entered the water, due to activities on the land and its surrounding areas. In order to understand this process, it is key to understand that the actions of human beings affect the quality of water, as much as the actions of fish, wildlife, and the natural processes within that watershed. When students understand the direct connection that exists between all the living beings in a watershed, they can begin to develop a sense of ecological responsibility.

The following activity, "Finding your Ecological Address," involves a watershed in which each flow of water is successively greater as it becomes streams, then little rivers, and finally the main river from which this water system derives its name. This system also includes the large lakes or the ocean into which this river flows. These are the systems that are subject to the contamination that comes from septic tanks that malfunction, from excess fertilizer, sediment that comes from bulldozed land, petroleum by-products, and other human waste. These systems are also affected by sediment and changes in temperatures that come from natural disturbances in the watershed.

When people have a clearer understanding of the environment, they have a better idea of how their personal actions, local laws and regulations, and other daily matters affect the integrity and stability of their ecological address and of their biological community.

Información para el/la maestro/a:

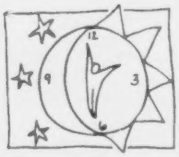
Si nos paráramos a la orilla de un río y miráramos río arriba, estaríamos viendo la vertiente del río. La mayor parte de esta vertiente consiste de tierra, no de agua. Y casi todo lo que afecta la salud ecológica del río ocurre en esta tierra.

El río y sus tributarios corren por la vertiente, recolectando aguas que contienen

materiales y contaminantes que entran al agua como resultado de la actividad en la tierra y sus alrededores. Para comprender este proceso es básico comprender que todo lo que hacen los seres humanos afecta la calidad del agua, así como lo que hacen los peces, animales, y los procesos naturales que ocurren dentro de la vertiente. Al comprender de una manera concreta la connección que existe entre todos los seres vivientes de una vertiente, los alumnos pueden empezar a desarrollar un sentido de responsabilidad ecológica.

La siguiente actividad, "Encuentra tu dirección ecológica", trata de una vertiente en que cada corriente de agua va creciendo más y más al convertirse en arroyos, en riachuelos y finalmente, en el río principal, de donde toma su nombre este sistema de agua. Este sistema también incluye los lagos grandes o el océano en que desemboca el río. Estos son los sistemas afectados por la contaminación que viene de las fosas sépticas que funcionan mal, del exceso de fertilizante, del sedimento que viene de la tierra volteada por gruas, de los productos del petróleo y de otros desechos humanos. A estos sistemas también les afectan el sedimento y los cambios de temperatura causados por alteraciones naturales en la vertiente.

Al tener una mayor comprensión del ambiente, la gente tiene una mejor idea de cómo sus acciones personales, las leyes, reglamentos locales, y demás asuntos diarios afectan la integridad y estabilidad de su dirección ecológica y su comunidad biológica.



Suggested Time

10 minutes — Welcoming
45 minutes — Homework/Learning Options
20 minutes — Guided Discussion
30 minutes — Finding Your Ecological Address
10 minutes — How We Affect Our Watershed
5 minutes — Closing

2 hours total

Materials

A teacher and, at least, one teaching assistant are recommended for this lesson. In addition, you will need the following materials:

- Handout 32.1, "Watershed Map" (one per student).
- Paper and materials for drawing watershed maps (enough for one map per student).

- ☆ Handout 32.2, "Home Action Plan" (one per student).
- ☆ String or yarn (about one foot per student).

Suggested Quote/Cita sugerida

The following quote or one of your choosing, may be useful to initiate or continue discussions about ideas that are important in this unit and these lessons.

I change myself, I change the world.

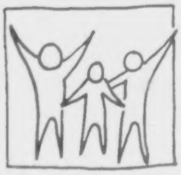
— Gloria Anzaldúa, as quoted in *The Fire in Our Souls*

Ms. Anzaldúa is co-author of *This Bridge Called My Back, Borderlands: The New Mestiza,* and most recently, the children's story "The Ghost Woman's Gift."

Me cambio a mi misma(o), y cambio el mundo.

— Gloria Anzaldúa

SESSION PLAN

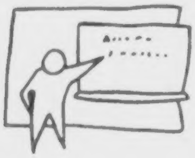


Welcoming (10 minutes)

Welcome students and take attendance. Remind students that they should bring in aluminum cans for the class recycling project. Although they will only chart class contributions once a week, any team charting should be done during this opening period.

Homework/Learning Options (45 minutes)

Students may use this time to complete homework, engage in free reading, or do any other program-related academic activity.



Curriculum

Guided Discussion: Learning about Watersheds (20 minutes)

Begin this discussion by asking students the following:

"Do you know your address?"

"¿Conocen su dirección?"

Write a few addresses on the chalkboard.

Tell students:

"These are cultural addresses to help locate your homes, so that mail can be delivered to them and so people can find them, and so emergency services such as police, fire, and medical help can be dispatched. This system needs to be in good condition in order for them to be able to do their work."

"You also have another very important address — your ***ecological address**. Just as your postal address tells you that you're connected to a community, your ecological address says how you're connected to the land you live on. You'll understand your ecological address better if we study the flow of water around us."

Dígale a los alumnos:

"Estas son direcciones culturales — para ayudar a localizar sus casas, para que el correo llegue y para que la gente pueda encontrarlos, y también para que los servicios de emergencia como la policía, los bomberos y la ayuda médica, se puedan despachar. Para que estas cosas funcionen, el sistema necesita estar en buenas condiciones".

"También tenemos otra dirección muy importante — nuestra ***dirección ecológica**. Al igual que una dirección postal nos dice cómo estamos conectados a una comunidad. Nuestra dirección ecológica nos dice cómo estamos conectados a la tierra donde vivimos. Comprenderemos mejor nuestra dirección ecológica si estudiamos las vertientes".

Ask students the following questions:

- ☆ What is a watershed?
- ☆ How big is a watershed?

Pregúntele a los alumnos:

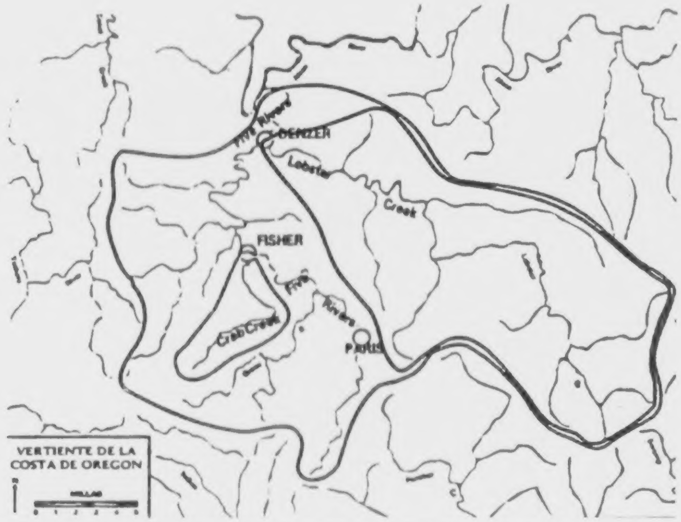
- ☆ ¿Qué es una vertiente?
- ☆ ¿De qué tamaño es una vertiente?

To help students understand the concept of a watershed more clearly, trace the outline of a student's hand (with fingers spread apart and including the wrist and lower forearm) on the chalkboard or on chart paper. Shade in the fingers, and mark the whole area "Green River." Tell students that this is a model of a watershed. The fingers represent the streams that flow into the main river (the arm). The shaded area between the fingers is land, where people live. Draw in trees and houses to help students visualize this. Tell students that, generally, the watershed takes its name from the stream or river that collects all the water in the area of the watershed. So, this watershed would be known as the Green River Watershed. Let them know that watersheds can be big or small. For example, the Columbia River Watershed in the Pacific Northwest covers 258,000 square miles.

Give each pair of students (or each individual) a copy of Handout 32.1, a map of a mountainous region. Tell students to locate a stream called Five Rivers (the letters A, B, C represent communities that the river runs through), and the place where Five Rivers runs into the Alsea River. Explain that the Alsea River empties into the Pacific Ocean.

Now, have them find the Crab Creek Watershed and circle it with a colored pencil or marker. Then, have them find and circle the Lobster Creek Watershed in a different color. Explain that the watershed ends when Crab Creek or Lobster Creek runs into Five Rivers. With a third color, draw a line around the entire Five Rivers Watershed (see Figure 1). Make sure they've correctly identified the watersheds before you move on (the Five River Watershed ends when it runs into the Alsea River).

Figure 1



Optional Activity:

"Instead of making maps of their own watershed, I thought it would be helpful if they had a hands-on experience with watersheds," reported Monica Incerti of Centro Latino de San Francisco. She provided this hands-on experience by allowing students to recreate their watershed using plywood, maps of California, and clay. "I purchased clay and the students put in the mountain ranges, which we had marked out for them on their maps. They loved using the clay to rub on the Nevada side of California, and painted in the Pacific. They drew in streams running down the mountains to the main rivers. Lastly, they used a small straw and put in the aqueduct from Hetch-Hetch to Crystal Springs. They filled it with water and watched it go through the straw to Crystal Spring... from this lesson they could see where the San Francisco Bay region gets its water, and the source in the Sierras." With a little research on your local watershed, state maps, and some clay, your students can map their own watershed.

Ask students:

- Which is the biggest watershed? [Five Rivers]
- How many circles or rings are inside the big circle? [2]
- If you lived in town C, which watershed would you live in? [Five Rivers]
- Do you think that you can live in more than one watershed at the same time? [Yes]
- If you lived in town B, which watershed would you live in? [Crab Creek and Five Rivers]

Remind students that a large watershed is composed of many small watersheds, so it is possible to live in two watersheds, at the same time. The two circles inside the big one mean that the big watershed (Five Rivers) is made up of two smaller watersheds (Crab Creek and Lobster Creek).

Pida a los alumnos que localizen un arroyo llamado Five Rivers y el punto donde Five Rivers desemboca en el Alsea River. (Five Rivers pasa por las comunidades A, B, y C). Explíqueles que el Río Alsea desemboca en el Océano Pacífico.

Luego pídale que localicen la vertiente de Crab Creek y que le hagan un círculo con un lápiz de color o marcador. Después pida que localizen la vertiente de Lobster Creek y le hagan un círculo de otro color. Con el tercer color, que hagan un circulo alrededor de toda la vertiente de Five Rivers. Asegúrese de que todos los grupos hayan identificado correctamente las vertientes antes de hacer las siguientes preguntas.

- ☆ ¿ Cuál es la vertiente más grande? [Five Rivers]
- ☆ ¿ Cuántos círculos hay adentro del círculo grande? [2]
- ☆ ¿Si vives en la comunidad "C", en qué vertiente vives? [Five Rivers]
- ☆ ¿Creen que uno puede vivir en varias vertientes al mismo tiempo? [Sí]
- ☆ ¿Si vives en la comunidad "B", en qué vertiente vives? [Crab Creek y Five Rivers]

Suggest that everyone lives in a watershed, and ask them to explain why they think this is true. Explain that all lands have some flow of water which drains into a larger current. For example, in most urban areas, rainwater flows into a rainwater drainage system. That drainage or sewer system eventually is drawn into a nearby river stream.

Finding Your Ecological Address (25 minutes)

Now, using the same map, tell students that they will pretend that letter D represents their home. This is their ecological address. Ask them the name(s) of the watershed(s) they live in. [Lobster Creek, Five Rivers.]

Discuss the fact that their ecological address can have several components, from the smallest watershed they can observe, to a larger system of which the smaller one is a part. Make this comparison to their home addresses:

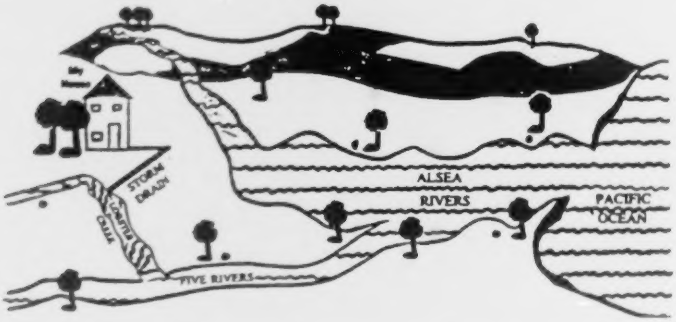
"You may live in a room, which is in a house (or an apartment), on a street, in a section of town, in a city, in a county, in a state, in a country, on a continent, etc."

Diga a los alumnos:

"Su dirección ecológica puede tener varias partes. Es como la dirección de su casa. Pueden vivir ustedes en un cuarto que está en una casa (o departamento), en una vecindad, en una ciudad, en un condado, en un estado, en un país, en un continente, etc."

Next, have students make maps of their "pretend" ecological address. The maps should not be to scale, but should represent the watershed(s) the students live in, and should allow them to trace the path of surface water from the time it lands on their lawn to when it empties into a lake or the ocean. Using the example in Figure 2, remind students that the Alsea River empties into the Pacific Ocean, and that a storm drain connects their house to the watershed.

Figure 2



Tell students that their actions can affect the quality and quantity of water available to all downstream areas.

Have students brainstorm activities which would affect these downstream areas. For example, discarding oil or other waste into a stream, clearing land and removing vegetation, over-fertilizing a lawn, allowing a septic tank to leak, or washing a car with soaps that contain phosphates, will all affect the land and communities downstream. Write a list of these activities on the board.

Using a string, and the "scale of miles" on the published map (Handout 32.1), have students calculate the number of miles from "their house" (letter "D") to the Alsea River. Imagine! This is the number of miles that their actions and those of their family would affect up to this point. In fact, their actions can be felt all the way to the end of the watershed until the Alsea River runs into the Pacific Ocean. (This fact isn't included on their maps.)

Distribute Handout 32.2, the "Home Action Plan" form. Have students make a list of the things (based on the list they started above) that they could do at home to reduce the negative effect that their families have on the watershed. You might find out the telephone number of the local Public Works Office, and have the students call to get additional ideas and printed information for an "At Home Action Plan." Have students use the form included in this lesson and bring it back the next day.

Pida a los alumnos que hagan una lista de las cosas que podrían tener efectos negativos en la vertiente. Por ejemplo: las actividades como tirar aceites y otros desperdicios a un arroyo, desforestar la tierra, fertilizar demasiado, dejar que el agua se escape de una fosa séptica, lavar un automóvil con jabón que contenga fosfatos, todas tienen efectos negativos sobre las tierras y las comunidades río abajo.

Optional Activity:

Show students a map of North America that indicates the path of the Colorado River through the Southwestern U.S. and into Mexico. Discuss the international ramifications of one country reducing the waterflow and contaminating a river that is also important to people in another country.

Closing (5 minutes)

Review the fact that we all live in a watershed, and that we share its water with many others. We have to share the water from the watershed with everyone else that lives at the same ecological address. Remind students that water is one of the five basic needs of both humans and animals. Ask students if they think there is enough of this essential element.

Parent Link

For many Latinos, water is precious and seldom taken for granted. Many of our parents can remember childhoods (or visits to the homes of relatives) where water was not wasted. Many had to draw water daily from wells or buy it at depositories and carry it home. It was not as easy as turning on the tap.

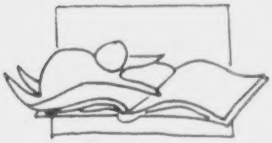
For this Parent Link, and the one in Lesson 33, have students talk to their parents about this topic, and record the recollections shared with them in their family nature journals. Then, have them do a water use survey of the house. Who leaves the faucet running? Who drinks the most water? Who wastes the most by staying in the shower too long? How else is water used? How else is

water wasted? Have students think of ways the family can save water, and have them develop a family water use plan.

Enlace familiar

Para muchos latinos, el agua es algo muy preciado y rara vez lo toman por sentado. Muchos de nuestros padres pueden recordar una niñez (o visitas a las casas de parientes) en la que no se hacia mal uso del agua. Mucha gente tenia que sacar el agua de pozos diariamente o comprarla de los depósitos y llevarla a la casa. No era tan facíl como abrir la llave del agua.

Para el enlace familiar de esta lección y la Lección 33, pida a los estudiantes que hablen con sus padres acerca de este tema y que anoten los recuerdos en su diario familiar sobre la naturaleza. Luego pídales que hagan una encuesta del uso del agua en la casa. ¿Quién es el que toma más agua?, etc. ¿Quién usa más agua quedándose en la ducha por mucho tiempo?, etc. Diga a los alumnos que piensen de qué manera se puede disminuir el uso del agua, y que desarrollen un plan familiar para su uso.



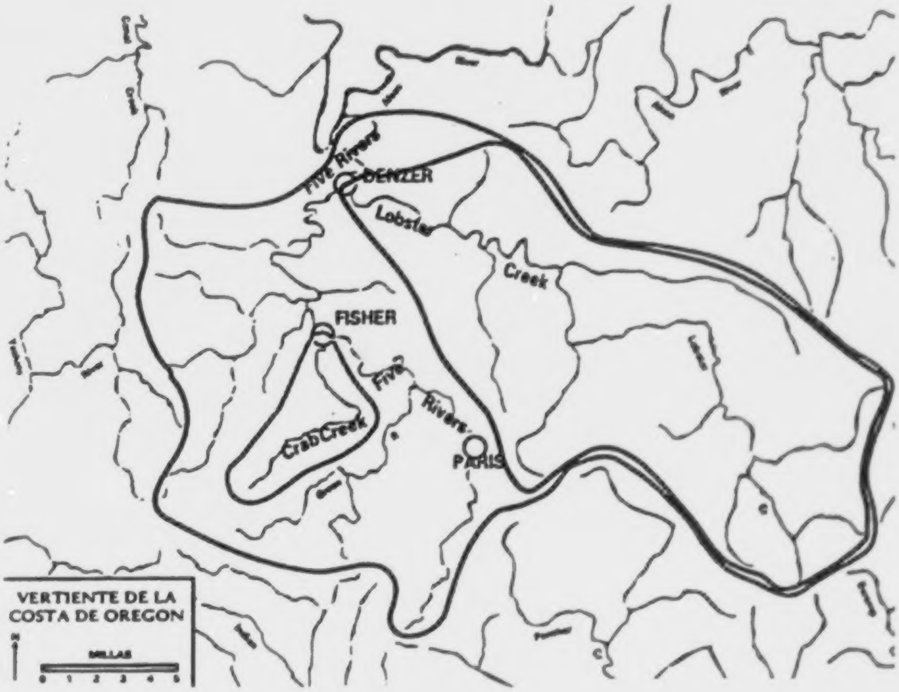
Literature Link

A River Ran Wild: An Environment History, by Lynne Cherry, tells the story of a river and the impact industry has on it. Recommended for grades 1-5.

409

Handout 32.1

River Systems



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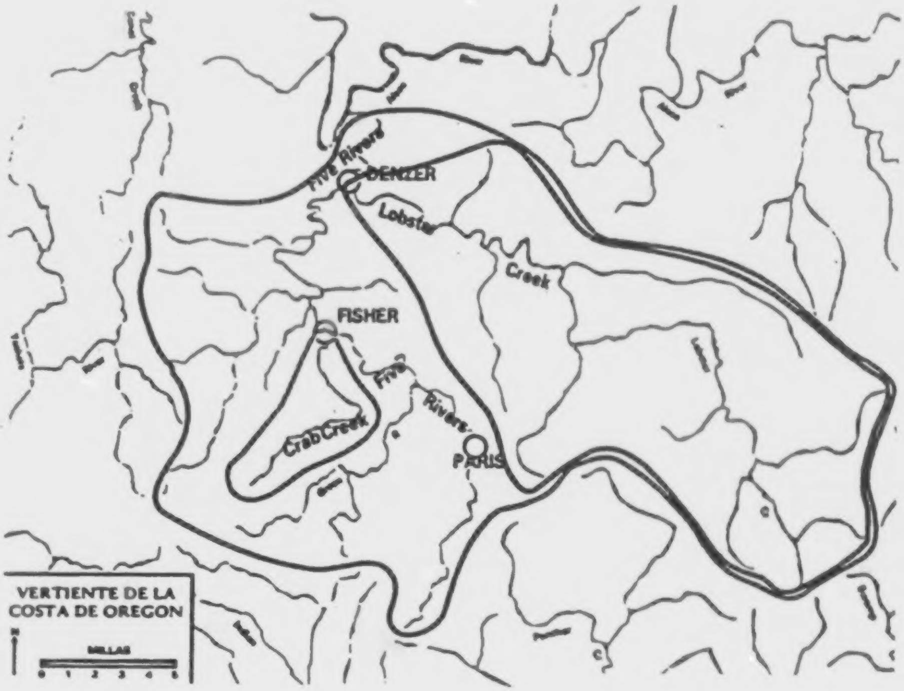
Hoja de trabajo 32.1

Sistemas de vertientes



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Handout 32.2

Home Action Plan

Student:____________________________

Actions that our family will take to help our watershed conservation	Ways that these actions will help the watershed

Hoja de trabajo 32.2

Plan de acción para el hogar

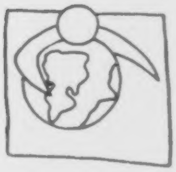
Alumno:______________________________

Cosas que nuestra familia hará para ayudar a conservar nuestra vertiente	Maneras en que estas acciones van a ayudar a la vertiente

413

Lesson 33

Watershed Woes (Part II)
¿Cuánto aguanta la vertiente? (Parte II)



Overview

Using problem-solving and math skills, students determine that a watershed is a limited resource. They begin to discover the importance of conservation and clean-up.

Resumen

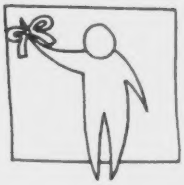
Utilizando destrezas de matemáticas y resolución de problemas, los alumnos determinan que una cuenca de agua es un recurso limitado. Empiezan a descubrir la importancia de la conservación y la limpieza.

Key Skills

Synthesizing
Measuring
Calculating
Experimenting
Problem-Solving
Community Planning
Making Inferences
Writing

Destrezas claves

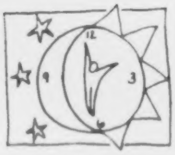
Sintetizar
Medir
Calcular
Resolver problemas
Planear en comunidad
Hacer inferencias
Redactar



Preplanning

1. Collect enough clear plastic beverage bottles to do the activity.
2. Gather several one-ounce liquid measures for students to use to calibrate the plastic bottles into 32 one-ounce gradations, or to calibrate paper cups which can be used as one-ounce measuring cups.
3. Arrange for a water source. A five-gallon bucket, or a sink full of water, will allow students to quickly (if not neatly) access water to mark and fill their bottles. It is a good idea to have a few sponges or towels ready to wipe up drips and dribbles.
4. Make copies of Handout 33.1.
5. Review the following terminology:

*drought	_*sequia_
*minimum flow	_*flujo minimo_



Suggested Time

5 minutes — Welcoming
45 minutes — Homework/Learning Options
15 minutes — Guided Discussion
25 minutes — Calculating Water Use
15 minutes — Debriefing
10 minutes — Journal
5 minutes — Closing

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2 hours total

Materials

A teacher and at least one teaching assistant are recommended to fully implement this lesson. In addition, you will need:

- ☆ Two-32 ounce clear plastic beverage bottles (per group).
- ☆ Handout 33.1 (one for each group of students).
- ☆ Roll of masking tape (three rolls for the class).
- ☆ Water source.
- ☆ One-ounce measuring cup for each group (this can be made from a paper cup).
- ☆ Writing materials.

Suggested Quote/Cita sugerida

The following quote or one of your choosing, may be useful to initiate or continue discussions about ideas that are important in this unit and these lessons.

I change myself, I change the world.

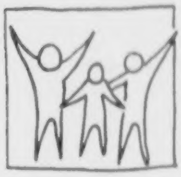
— Gloria Anzaldúa, as quoted in *The Fire in Our Souls*

Ms. Anzaldúa is co-author of *This Bridge Called My Back, Borderlands: The New Mestiza,* and most recently, the children's story "The Ghost Woman's Gift."

Me cambio a mi misma(o), y cambio el mundo.

— Gloria Anzaldúa

SESSION PLAN



Welcoming (5 minutes)

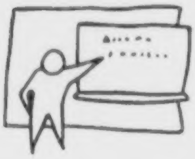
Welcome students and allow each team to do any necessary charting for the recycling project. Explain that water in a watershed is assigned to a variety of uses. When the water is completely used and there is a ***drought**, serious conflicts may arise concerning who the available water belongs to. These conflicts usually have to be resolved in court using "water rights" laws.

Explique a los alumnos:

"Al agua de una vertiente se le asignan varios usos. Cuando toda el agua se ha utilizado y hay una ***sequía**, se crean serios conflictos en cuanto a quién le corresponde el agua disponible. Estos conflictos generalmente se resuelven en un tribunal legal, según las leyes de 'derechos de agua'".

Homework (45 minutes)

Students may use this time to complete homework, engage in free reading, or do any other program-related academic activity.



Curriculum

Guided Discussion (15 minutes)

Ask students:

"What are the ways we use water in our watershed? Let's list them."

As students suggest water uses, put their suggestions in categories like those that follow:

Household Uses, Industrial Uses, Irrigation Uses, Energy Uses, and Recreational Uses.

Examples of each of these uses are as follows:

- Household Uses: drinking, cooking, washing, etc.
- Industrial Uses: food preparation, factories.
- Irrigation Uses: farming.
- Energy Uses: dams, hydroelectrical power.
- Recreational Uses: swimming, boating, water skiing, etc.

Pregunte a los alumnos:

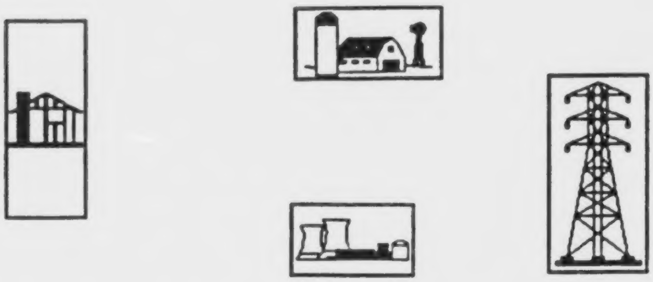
"¿Cuáles son los usos del agua en nuestra vertiente? Vamos a hacer una lista de ellos".

Ponga las sugerencias en categorias como la siguiente: los domésticos, usos industriales, usos de irrigación, usos de energía y usos recreativos. Ejemplos de los usos de cada categoria incluyen:

- ☆ Usos domésticos: beber, cocinar, lavar, etc.
- ☆ Usos industriales: preparación de alimentos, fábricas.
- ☆ Usos de irrigación: agricultura.
- ☆ Usos de energía: presas, energía hidroeléctrica.
- ☆ Usos recreativos: nadar, andar en lancha, esquiar, etc.

Use a symbol or a drawing to represent these various uses (for example those used in Figure 1). These representations will be helpful in the activity that follows.

Figure 1



Review these five uses with students. If they do not include the following use tell them:

"There is another very important use that we haven't mentioned. This is called ***minimum flow*** and it is the amount of flowing water needed in the watershed to keep all the animals, fish, and plants that live in the area alive and healthy."

Dígale a los alumnos:

"Hay otro uso muy importante que debemos añadir a la lista. Se llama ***flujo mínimo***; éste es la cantidad mínima de agua que debe correr por la vertiente para mantener vivos y saludables a todos los animales, peces, y plantas que viven del agua de la vertiente".

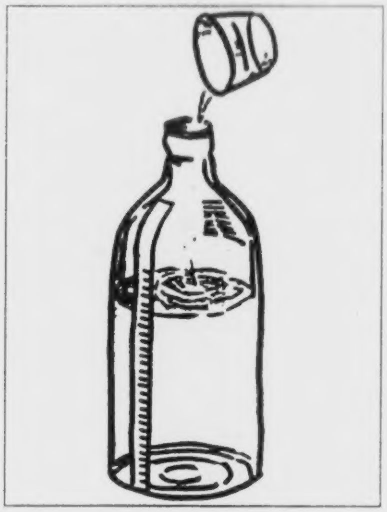
Calculating Water Use (25 minutes)

Divide students into their cooperative learning teams, or into groups of two or three. Have them prepare one of their 32-ounce bottles by placing a strip of masking tape around the entire length of the bottle, and marking the bottle in one-ounce gradations until the bottle is full. They can do this by pouring one ounce of water into a paper cup and marking the level on the side of the cup, and repeating the operation until they reach the top of the bottle. Have them number the marks. (See Figure 2.)

Suggestion...

An instructor at Centro Latino de San Francisco had students fill up their bottles using two-ounce gradations. This took less time and also provided students with a mathematical challenge.

Figure 2



After students have finished preparing their bottles, tell them:

"The full bottle represents all the water available in the watershed."

Dígale a los alumnos:

"La botella de plástico representa toda el agua disponible en la vertiente."

When students have calibrated and filled their bottles, explain that they will be figuring out how many people this watershed can support.

Give each group a copy of Handout 33.1, and/or work through the first row with them by proceeding as follows:

1. Let's pretend that you and your family live in this watershed all by your-

selves. The house that is all by itself on the worksheet belongs to you. We want to figure out how much of the water in the watershed will be used when just you and your family live here all alone if:

☆ ***Minimum flow** always uses six ounces of the 32 ounces in the plastic bottle (this is only subtracted once from the 32 ounces).

☆ Household use requires one ounce for every household.

☆ Industrial use requires two ounces to support every household.

☆ Irrigation requires one ounce to support every household with food.

☆ Energy use requires two ounces to support every household.

[Write the above list on the chalkboard so students can refer to it.]

We will first remove the water for ***minimum flow**. This is the amount of water that we need to keep plants, animals, and fish alive and healthy. Read the sides of your bottle and write the answer to this on number two in your worksheet. Also fill in the answers to numbers one and three. [Make sure they have completed this before moving on]. Now, remove the rest of the water your household will use — take out for all the other uses listed on the board. Now how much water is left? Fill in number four on your worksheet.

2. Teresa and her family move into this town. We have to figure out how much more water will be taken from the watershed if there are two households. Remember how much each household uses. Complete number five on the worksheet, and remove the indicated amount of water form the bottle. Read the side of your bottle and write down how much water is left in your watershed. Is there enough water for your family and Teresa's? [yes]
3. People begin to hear that this is a very nice place to live, so two more families move to town. Who thinks that there is enough water in the watershed for four households? Remove the amount of water for two extra households. Read the side of your bottle and write down how much water is left in your watershed. Is there enough water for you, Teresa and two other families?
4. Finally, two more families move to town because they hear so many good things about this place. Let's find out if there is enough water in the watershed for six households. Remove from your bottle the amount of water that two more households will require. Is there enough water in the watershed for the six families?

Allow students to complete the worksheet on their own or in their groups.

---

1. **Vamos a hacer de cuenta que ustedes y su familia son los únicos que viven en esta vertiente. La casa que está sola en la hoja de trabajo es la de ustedes. Queremos calcular la cantidad de agua que se usará de la vertiente mientras viven solos aquí si pasa lo siguiente:**

- ☆ El flujo mínimo siempre usa seis onzas de las 32 que tiene la botella de plástico (esto se resta solamente una vez de las 32 onzas).
- ☆ El uso doméstico requiere una onza para cada hogar.
- ☆ El uso industrial requiere dos onzas para sostener cada hogar.
- ☆ El uso de irrigación requiere una onza para sostener el alimento de cada hogar.
- ☆ El uso de energía requiere dos onzas para sostener cada hogar.

(Copie esta lista en la pizarra para que los estudiantes puedan referirse a ella.)

Primero, vamos a sacar el agua para el flujo mínimo. Esta es la cantidad mínima de agua que necesitamos para mantener vivos y saludables a todos los animales, peces y plantas que viven del agua de la vertiente. Lean el lado de la botella y escriban la respuesta en el número dos de la hoja de trabajo. Ahora, saquen el agua que se va a usar en su casa — saquen agua para todos los usos que están en la lista. Ahora, ¿qué cantidad de agua nos queda? Apúntenla en el número cuatro de la hoja de trabajo.

2. Ahora se mudan a este lugar Teresa y su familia. Tenemos que calcular qué cantidad adicional de agua de la vertiente se usará cuando hayan dos casas. Recuerden qué cantidad de agua usa cada hogar. Completen el número cinco de la hoja de trabajo y saquen de la botella esa cantidad de agua. Lean el lado de la botella y apunten qué cantidad de agua queda en la vertiente. ¿Hay suficiente cantidad de agua para su familia y la de Teresa? [Sí]
3. La gente empieza a oír que este es un lugar muy lindo para vivir, y se mudan aquí otras dos familias. ¿Quién cree que haya suficiente cantidad de agua en la vertiente para cuatro familias? Saquen de la botella la cantidad de agua que se necesita para dos casas más. Lean el lado de la botella y apunten la cantidad de agua que queda en la vertiente. ¿Hay suficiente agua en la vertiente para su familia, la de Teresa y dos familias más?
4. Finalmente, se mudan a este pueblo otras dos familias porque han oído muchas cosas buenas del lugar. Vamos a ver si hay suficiente en la vertiente para sostener a seis familias. Saquen la cantidad de agua que necesitan dos casas adicionales. ¿Hay suficiente agua en la vertiente para las seis familias?

Debriefing (15 minutes)

When students have completed the worksheet, ask them:

"What does the chart you created on the worksheet tell you about the watershed? Can it support an unlimited number of people?" [No.]

Tell students:

"There are many river systems in the United States that are 'over-subscribed,' meaning that more water is taken out than the system can support. In years of drought, this can become a very serious matter."

Dígale a los alumnos:

"¿Qué nos dice la gráfica acerca de la vertiente? ¿Puede sostener un cantidad de gente sin límite? [no]. En los Estados Unidos hay varias vertientes que están 'sobre-usadas.' Esto quiere decir que la cantidad de agua que se saca es más de lo que el sistema puede aguantar. En épocas de sequía, esto puede causar problemas muy serios".

Give students time to discuss the list of things they could do to allow their hypothetical town to grow larger and yet not use all the water from the watershed.

After students discuss their list, explain to them that in a real watershed, some of the used water is returned to the watershed. For example:

Home use - most can be returned.

Industrial use - most can be returned.

Irrigation use - a small portion is returned.

Energy use - all can be returned.

Recreational use - water is lost from large lakes in arid regions, but almost all can be returned.

En una vertiente real, una porción del agua utilizada se devuelve a la vertiente después de usarse.

Uso doméstico - se puede devolver la mayor parte.

Uso industrial - se puede devolver la mayor parte.

Uso de irrigación - se puede devolver una pequeña porción.

Uso para energía - se puede devolver todo.

Uso recreativo - en regiones áridas se pierde agua de los grandes lagos, perose puede devolver casi todo.

Have each student group discuss the following question:

Do you think anything should be done to the water before it is returned to the watershed?

Pida que cada grupo de estudiantes discuta la siguiente pregunta:

¿Creen ustedes que hay que hacerle algo al agua antes de devolverla a la vertiente?

The emphasis here is to make students realize that water used for home, industrial, and irrigation use needs to be cleaned before it is returned to the watershed.

Journal (10 minutes)

To continue the topic introduced in the debriefing session, have students write in their journals about what could happen to people and the animals that use the water from the watershed if the water is not cleaned or treated before being returned to the watershed.

Closing (5 minutes)

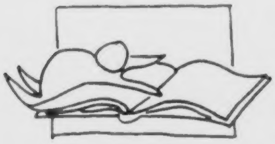
Thank students for their efforts and review some of the things they have accomplished thus far in Unit 4, and have a few of them read the results of the "Home Action Plan" form they completed at home.

Parent Link

Please refer to Lesson 32's Parent Link.

Enlace familiar

Por favór refiérase al enlace familiar de la Lección 32.



Literature Link

The Berenstain Bears and the Coughing Catfish, by Stan and Jan Berenstain; *The Magic School Bus at the Waterworks*, by Joanna Cole; and *The Missing Gator of Gumbo Limbo: An Ecological Mystery*, by Jean C. George all provide great links to this topic. The first two titles are recommended for grades K-4. *The Missing Gator of Gumbo Limbo* is recommended for grades 4-7.

Handout 33.1

Watershed Woes Worksheet

1. How many ounces of water does your watershed contain? _____ ounces.
2. How many ounces do you have to remove from the watershed for minimum flow? _____ ounces.
3. How many ounces do you have left in the watershed? _____ ounces.

No. of Households					No. of Ounces Remaining
4.	1			2	
5.		2			
6.			2		
7.	2				

8. Is there enough water in the watershed for 4 households? _____.
9. Is there enough water in the watershed for 6 households? _____.
10. In the spaces below, list all the things you could do in your town so that there will be enough water for six households.

11. Challenge: Is there enough water in the watershed for 5 households? _____.

Hoja de trabajo 33.1

¿Cuánto aguanta la vertiente?

1. ¿Cuantas onzas de agua contiene la vertiente?_____ onzas.
2. ¿Cuantas onzas de agua hay que sacar de la vertiente para el flujo mínimo? _____ onzas.
3. ¿Cuantas onzas quedan en la vertiente? _____ onzas.

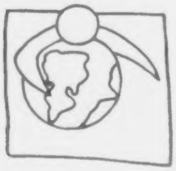
Número de Casas					No. de onzas que sobran
4.	1			2	
5.		2			
6.			2		
7.	2				

8. ¿Hay suficiente agua en la vertiente para 4 casas? _____.
9. ¿Hay suficiente agua en la vertiente para 6 casas? _____.
10. En el espacio que sigue, escribe una lista de lo que puede hacer la gente de tu pueblo para que haya suficiente agua para 6 casas.

11. Reto: ¿Hay suficiente agua en la vertiente para 5 casas? _____.

Lesson 34

People, People Everywhere
Gente, gente por todas partes

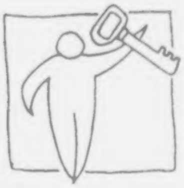


Overview

Students deepen their understanding of the meaning of "limited resources" through this lesson that explores populations and population growth. Students learn that, through cooperation, there is room for all of us. This lesson uses activities developed by the National Science Foundation for National Science and Technology Week.

Resumen

En esta lección se exploran las poblaciones y su aumento y los alumnos profundizan su comprensión con respecto a que los recursos son limitados. A través de la cooperación, aprenden que hay espacio para todos. Esta lección utiliza actividades desarrolladas por el National Science Foundation para la Semana Nacional de Ciencias y Tecnología.



Key Skills

Experimenting

Role Playing

Analyzing

Synthesizing

Destrezas claves

Hacer experimentos

Representar papeles

Analizar

Sintetizar

Preplanning

1. Ask students to bring in a picture of themselves. Prepare a space on a bulletin board for a collage of student pictures. Make a heading for the bulletin board that reads "We Count!"

2. Decide where to mark the space for the "small world." The space should be 10 square feet per student. (A class of 30 students would need a space 300 square feet in area, or about 15 feet by 20 feet.) Delineate this area with masking tape on the floor of the classroom, or with chalk or rope on the playground.
3. Cut the string into 10-foot lengths and loop it to prevent tangling.
4. Read "Background for the Teacher."
5. Review the following terminology:

** population*	** población*
** census*	** censo*

Background for the Teacher

The United States is not generally considered an overpopulated country. Much of the U.S. population is concentrated in cities, and there are still areas of the country where no one lives. However, the impact of people on the environment depends not only on their number, but also on their activities. For example in both developed and developing countries, people in the middle to upper classes are always on the go — as commuters, vacationers, traveling for business or for pleasure — by car, bus, and plane. Much of the damage to the environment is related to transportation. There are currently 500 million registered automobiles on the planet, and each burns an average of two gallons of fuel each day. Filling the tanks of these automobiles consumes about one-third of the world's production of oil. People in the United States may not be as overcrowded as the people in India, but our impact on the environment is greater.

The increase in cars, power plants, industry, as well as the need for expanded food production for more people, has meant more pollution. Rising levels of chlorofluorcarbons, together with methane, are exacerbating the greenhouse effect. Deforestation is directly related to the demand from expanding populations for building materials, firewood, additional farmland, and foreign capital. In Brazil, people from overpopulated regions have destroyed millions of acres of rainforest in an attempt to make a living from soil that is essentially unsuitable for farming.

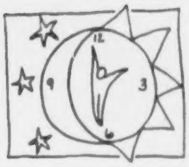
The solution to these and other environmental problems lies in a truly global effort, involving collaboration by scientists, citizens, and world leaders. Individuals have begun to alter their values, beliefs, and actions as they become more aware of environmental changes, but it is as a member of a larger group — the global population — that individuals can solve and manage the planet's problems. Developing countries need help to adopt environmentally-sound technologies as they increase the standard of living for their growing populations, while industrialized nations need to reduce their disproportionate use of the Earth's resources.

Información para el/la maestro/a:

Generalmente no se considera a los Estados Unidos como un país sobrepoblado. Gran parte de su población está concentratada en las ciudades, y aún quedan partes del país en donde no vive nadie. Sin embargo, el impacto de la gente sobre el ambiente no solamente depende de su número, sino también de sus actividades. Por ejemplo, en los países desarrollados y en vías de desarrollo las personas de la clase media y alta están siempre en movimiento — como trabajadores, vacacionistas, por negocios o por placer — en carro, en autobús, y en avión. Una gran parte del daño al ambiente está relacionado con el transporte. En la actualidad existen en el planeta 500 millones de automóviles registrados y cada uno consume un promedio de dos litros diarios de combustible. Al llenar los tanques de estos automóviles se consume una tercera parte de la producción mundial de petróleo. Quizás en los Estados Unidos la gente no esté tan amontonada como en la India, pero tenemos un gran impacto sobre el ambiente.

Más carros, más plantas de electricidad, más industria y más producción de alimentos para más personas han resultado en más contaminación. Los niveles más altos de fluorocarbonos de cloro, junto con el gas metano, están acelerando el "efecto de invernadero". La desforestación está directamente relacionada a la demanda entre las poblaciones crecientes de materiales de construcción, leña para quemar, tierras de cultivo, y capital extranjero. En el Brasil, los campesinos de regiones sobrepobladas han destruído millones de hectáreas de selva tropical, tratando de ganarse la vida usando tierras que no se pueden cultivar.

La solución a este problema y a los demás problemas ambientales consiste en un esfuerzo global verdadero, que requiere la colaboración de científicos, ciudadanos y líderes mundiales. Aunque muchas personas individuales hayan comenzado a cambiar sus valores, creencias y acciones al hacerse más conscientes de los cambios ambientales, para manejar los problemas del planeta estas personas también deben funcionar como miembros de un grupo mayor — la población global. Los países en vías de desarrollo necesitan ayuda para implementar tecnologías sanas para elevar el nivel de vida de sus poblaciones crecientes, mientras que los países industrializados necesitan reducir su uso desproporcionado de los recursos de la Tierra.



Suggested Time

10 minutes — Welcoming
45 minutes — Homework/Learning Options
10 minutes — Guided Discussion
25 minutes — Let's Make Room
20 minutes — Debriefing
10 minutes — Closing

2 hours total

Materials

A teacher can conduct this lesson alone, if necessary. You will need the following materials:

- One 12" by 18" piece of green construction paper for each student.
- One 10" piece of string for each student.
- Tape or chalk to mark boundary lines.
- Chart paper and markers.

Suggested Quote/Cita sugerida

The following quote or one of your choosing, may be useful to initiate or continue discussions about ideas that are important in this unit and these lessons.

I change myself, I change the world."

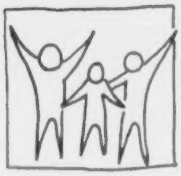
— Gloria Anzaldúa, as quoted in *The Fire in Our Souls*

Ms. Anzaldúa is co-author of *This Bridge Called My Back*, *Borderlands: The New Mestiza*, and most recently, the children's story "The Ghost Woman's Gift."

Me cambio a mi misma(o), y cambio el mundo.

— Gloria Anzaldúa

SESSION PLAN



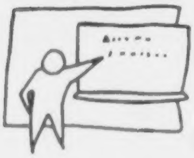
Welcoming (10 minutes)

Welcome students, and ask for a student volunteer to chart class recycling contributions. Provide assistance as necessary.

Ask students to recount the conflict they were confronted with in the previous lesson: there was not enough water in the watershed for all the families who wanted to live there. Tell them that the problem we face with limited amounts of water from watersheds can happen with other valuable resources too. Have students think of other examples of resources that we have to share with other people and animals. Tell students that the next few lessons look at how we can make sure of having enough resources for everyone and everything.

Homework/Learning Options (45 minutes)

Students may use this time to complete homework, engage in free reading, or do any other program-related academic activity.



Curriculum

Guided Discussion (15 minutes)

Before beginning the discussion, design and assemble the "We Count!" bulletin board with students. Ask them to make a collage of their photos on the bulletin board space you have prepared. You might consider letting them sign their names by their photos. Let students be creative and personalize their bulletin board.

Explain the following:

1990 was a ***census*** year in the U.S. Every ten years the U.S. government tries to count the number of people who live in the United States. If you were born in the United States, your birth was recorded and added to the number of people living in this country, or if you moved to this country, you were added to the number of people living here when you did, and became part of the U.S. ***population***. The government looks at these records, addresses of homes, and shelters for the homeless to locate all the people who live here. 1990 was the first year that all people who were born since 1980, or who are new to this country, were included in the government count. The number turned out to be very big — over 250 million people, and each one of them counts!

The number of people that make up the Earth's ***population*** is even bigger, because it includes every girl, boy, woman, and man in all countries on the Earth. Some ***populations*** are easier to count. For example, how about all the brown-eyed people in the classroom? Or all the people who know long division? Or all the people who wore tennis shoes today? There can be ***populations** of other things besides people, too. How many desks are in the room? The desks are the members of the "desk population" in this classroom.

A ***population** is the total number of a certain thing in a certain place at a certain time.

Explíque a los alumnos:

El año 1990 fue el año del ***censo** en los Estados Unidos (EEUU). Cada diez años el gobierno trata de contar el número de personas que viven en los EEUU. Si ustedes nacieron en los EEUU, sus nacimientos fueron registrados y se les agregó al número de personas que estan viviendo en este país; o cuando vinieron a vivir a este país, se les agregó al número de personas viviendo aquí y formaron parte de la ***población**. Para localizar a toda la gente que vive aquí, el gobierno revisa los registros, las direcciones de las casas, y los albergues para personas sin hogar. En 1990 por primera vez fueron incluídas en el ***censo** las personas que nacieron o llegaron a este país después de 1980. El número resultó ser muy grande — más de 250 millones de personas y cada una de ellas cuenta!

La cantidad de personas que compone la población de la Tierra es aún mayor, porque incluye cada niña, niño, mujer y hombre de todos los países del mundo. Hay otras poblaciones mas fáciles de contar. Algunos ejemplos serían: todos los alumnos de ojos cafés, o que sepan hacer la división larga, o que hoy lleven puestos zapatos ténis.

Además, también pueden haber poblaciones de cosas, no sólo de personas. ¿Cuántos escritorios hay en el salón? Los escritorios forman parte de la "población de escritorios" del salón.

Una ***población** es el número total de cierta cosa en cierto lugar en cierto tiempo.

Remind students that they are members of many populations; members of the United States population and the Earth's population.

Ask students:

"What other populations are you members of? What state population are you a member of? What city and county populations are you a member of? To which funny populations do you belong?"

Dígale a los alumnos:

"Ustedes pertenecen a muchas poblaciones; pertenecen a la población de los EEUU y de la Tierra. ¿A qué otras poblaciones pertenecen? ¿A la población de qué estado pertenecen? ¿A la población de qué ciudad y qué condado pertenecen? ¿A qué poblaciones chistosas pertenecen?"

Encourage students to play with the concept of population to strengthen their understanding of a complex idea.

Let's Make Room (15 minutes)

Ask them:

"How does it feel when there is not enough of something? For example, not enough sandwiches or not enough chairs?"

Allow students to think about this question and respond.

Pregunte a los alumnos:

"¿Comó se siente uno cuando no alcanza algo, como por ejemplo, las tortas o las sillas?"

Show students the marked-off area. Tell them to pretend that this area is the entire world, and that they will each have an opportunity to live there.

Have them sit around the edge of the small world. Show them a piece of green paper and string, and tell them the following:

"The green paper represents a garden where you can grow food in the small world. You will also need a place to sleep in this world. Use the string to create a sleeping space by laying it in a rectangular shape on the floor. You will also need to exercise when living in the small world, so save some space for that."

Dígale a los alumnos:

"El papel verde representa un jardín donde pueden cultivar su comida en el mundo pequeño. También necesitan un lugar para dormir. Para hacerse un lugar para dormir, con el cordón hagan un rectángulo en el piso. Para vivir en este mundo necesitan hacer ejercicio, así es que también aparten un lugar para eso".

Ask students to try living in the small world. Begin with four students, give each one a green paper and a piece of string, and have them step into the "small world." Ask them to find a space for gardening, sleeping, and exercising.

Give them time to lay out their garden paper, lay out their string to create a sleeping area, and identify a place to exercise. Allow two or three minutes time for them to pretend to garden, sleep, and exercise.

Bring in four more students, and give each a green paper and piece of string. Newcomers should attempt to find space to do each of the three activities. Continue adding students until problems with the amount of space arise. Do not wait until real conflict breaks out. Stop adding students when newcomers cannot easily find space for their activities.

Have students sit down to discuss what happened.

Ask them:

"What can you do to make room for more people?"

Pregunte a los alumnos:

"¿Qué pueden hacer para que haya lugar para más gente?"

Students may suggest some of the following choices: making smaller gardens (overlapped, folded, or smaller papers); creating smaller sleeping spaces (students could sleep sitting or standing up); or sharing their spaces.

Tell them:

"If you decide to share spaces or make them "smaller", who in your "small world" will have smaller or shared gardens or sleeping spaces? Everyone living in the world? Only some people? What problems do smaller gardens, smaller sleeping spaces, and less room to exercise present?"

Pregunte a los alumnos:

"Si deciden compartir los espacios o hacerlos más pequeños, ¿para quiénes van a ser los jardines y lugares para dormir más pequeños? ¿Para todas las personas que viven en el mundo pequeño, o solamente para algunas? ¿Qué problemas se presentan si los jardines y lugares para dormir son más pequeños, y si hay menos espacio para hacer ejercicio?"

Review the idea of cooperation. Once students understand that when they are cooperating they are working together toward a common goal, continue to bring more students into the small world. Students in the small world will need to cooperate to accommodate the needs of additional students.

When all students have had the opportunity to live in the small world, conclude the activity.

Debriefing (15 minutes)

Ask students:

"Do you see the connection between this activity and the problems that face the global community because of the growth of the Earth's population?"

Pregunte a los alumnos:

"¿Pueden ver la relación entre esta actividad y los problemas a los que se enfrenta el mundo en general por el aumento de la población de la Tierra?"

Use information from the "Background for the Teacher" to remind students of some of the problems related to the population.

Explain the following:

"It is important for us to remember that the population, or the number of people in a particular area, isn't what hurts the environment. It is true that we might have to cut down trees or pave grassy areas to make room for people (as we did in our caterpillar activity in Unit 2). It is also true that if there are more people we use more resources [remind students about the five basic essential elements], but countries with larger populations than the United States do not have as great an impact on the environment as we do. Why do you think this is? [They may not drive as many cars, have less industry, and/or less consumption]. Just as in our "small world" activity, there is plenty of room if we learn about cooperation. Everybody needs to do their share as part of the global population."

Díga a los alumnos:

"Es importante recordar que la población, o la cantidad de gente en cierta área, no es lo que daña al ambiente. Es cierto que quizás tuviéramos que cortar árboles o pavimentar áreas verdes para hacer espacio para la gente. También es cierto que países con poblaciones mayores que la de los Estados Unidos afectan menos al ambiente que nosotros. ¿Por qué creen que será esto? Al igual que en nuestra actividad del pequeño mundo, hay suficiente espacio para todos si aprendemos a cooperar. Cada persona tiene que poner de su parte como miembro de la población global".

Rationale...

It is critical to share this information with students to dispel any myths they may have regarding the relationship between "overpopulation" and lack of resources. While overpopulation can severely tax natural resources, so can the unequal distribution of those resources, or lifestyles that over-consume resources. A country with a large population does not necessarily consume as much, or waste as many resources, as a country whose people and animals regularly go hungry or become homeless.

Provide the following examples to help clarify the above information:

- Countries such as Brazil and Senegal have plenty of space for their populations and plenty of farmland, but people in these countries still suffer from lack of resources (i.e. food, shelter, land, etc.) Why would this be?
- The Netherlands, with almost fifteen times as many people per square mile as the United States, exported more agricultural products than it imported.
- A child living in Los Angeles or New York City — both cities with large populations — may have more resources than a child living on a farm in a rural area. Why might these differences exist?

Cooperation among people needs to be stressed.

Razón fundamental...

Es muy importante compartir esta información con los alumnos para desmentir cualquier mito que puedan creer acerca de la relación entre la "sobrepoblación" y la falta de recursos.

Aunque es cierto que la sobrepoblación puede seriamente reducir los recursos naturales, otras causas pueden ser la desigualdad en la distribución de aquellos recursos, o los estilos de vida excesivos, que consumen demasiados recursos. El que un país tenga una población grande no necesariamente significa que a su gente y sus animales les faltará alimento y albergue. Los siguientes ejemplos sirven para aclarar esta cuestión:

- ☆ Los países como el Brasil o Senegal tienen bastante espacio para sus poblaciones, y suficiente tierra agricultural, pero su gente todavía sufre de la falta de recursos (es decir, alimento, albergue, tierra, etc.) ¿Porqué será?
- ☆ Los Países Bajos, que tienen casi quince veces más personas por milla cuadrada que los Estados Unidos, exportan más productos agrícolas que los que importan.
- ☆ Un niño que vive en Los Angeles o Nueva York — dos ciudades con grandes poblaciones — puede tener más recursos que un niño que vive en una granja en una área rural. ¿Porqué existirán estas diferencias?

Hay que enfatizar la cooperación entre la gente.

Closing (10 minutes)

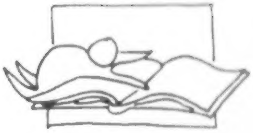
Review the concepts that were introduced today. In particular, review what a census is. Tell students that in the next lesson they will be taking their own _*census_ of a special population. If time allows, take a few moments to have students discuss their parents' childhood experiences involving water use and access, and to share some of the ideas they came up with to help their families save water.

Parent Link

Have students work with their families to determine the population of the city they live in. How does the population break down by culture and ethnicity? How many different countries are represented in the city they live in? Can they identify, or arrive at an estimate of their neighborhood's population? What countries, ethnicities, cultures are most represented in their neighborhood? Is the city they live in overpopulated? Are there any essential resources that have become limited?

Enlace familiar

Pida a los estudiantes que trabajen con sus familias para determinar el número de la población de la ciudad donde viven. ¿Cómo se divide la población por medio de la cultura y la etnicidad? ¿Cuantos paises están representados en la ciudad donde ellos viven? ¿Pueden ellos identificar o estimar la población total de su vecindario? ¿Qué paises, grupos étnicos, culturas son los más representados en su vecindario? ¿Está sobrepoblada la ciudad donde viven ellos? ¿Se han limitado algunos recursos escenciales?



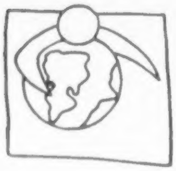
Literature Link

It's Mine, by Leo Lionni, is awonderful book for helping young children (K-2) understand the value of sharing. Three selfish frogs learn the benefits of the cooperative spirit as they quarrel over who owns their pond.

In Spanish, *El prado del tío Pedro*, written by Maria Puncel, tells the story of three sons who share a piece of land. The sons need to come up with a solution when each decides they want a greater share of the land. Recommended for grades 3-6. [Available from Hispanic Book Distributors.]

Lesson 35

Census Sweet Census
Censo, dulce censo



Overview

In this lesson, students continue their exploration of populations by conducting a census of Gummi Bears™. This lesson is adapted from an activity developed by the National Science Foundation for National Science and Technology Week.

Resumen

En esta lección los alumnos continúan su exploración de las poblaciones al conducir un censo de Gummi Bears™. Esta lección se adaptó de una actividad desarrollada por el National Science Foundation para la Semana Nacional de Ciencia y Tecnología.

Key Skills

Estimating

Graphing

Predicting

Interpreting data

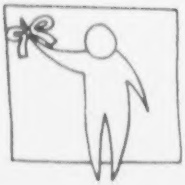
Destrezas claves

Estimar

Hacer gráficas

Hacer predicciones

Interpretar datos



Preplanning

1. Prepare prediction chart for presentation on the blackboard, overhead projector, or flip chart. Use the figure below as a pattern.
2. Purchase Gummi Bears™ or substitute materials.
3. Pre-package bulk materials (Gummi Bears™) using plastic sandwich bags ($\frac{1}{4}$ to $\frac{1}{3}$ cup per bag will be sufficient for this activity).

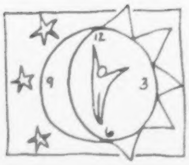
Figure 1

Predictions/Predicciones

Color/Color	Group/Grupo				
	1	2	3	4	5
Red/Rojo					
Green/Verde					
Yellow/Amarillo					
Orange/Anaranjado					
Total/Total					

4. Make copies of Handout 35.1.
5. Review the following terminology:

   sample   ***muestra***



Suggested Time

10 minutes — Welcoming
45 minutes — Homework/Learning Options
30 minutes — Census Sweet Census
15 minutes — Discussion/Debriefing
15 minutes — Journaling
5 minutes — Closing

2 hours total

Materials

A teacher can conduct this lesson alone, if necessary. You'll need the following materials:

- Packages of Gummi Bears™ or a substitute such as jelly beans, mixed dried beans, or any material that contains at least four different colors and is packaged randomly as to color (one package for each group of 3 students).
- Colored pens, pencils, or crayons that match the colors of the Gummi Bears™ (or other materials being used in activity).
- Handout 35.1, "Census Chart."

Suggested Quote/Cita sugerida

The following quote or one of your choosing, may be useful to initiate or continue discussions about ideas that are important in this unit and these lessons.

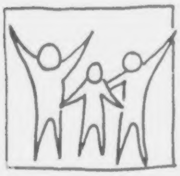
I change myself, I change the world.

— Gloria Anzaldúa, as quoted in *The Fire in Our Souls*

Ms. Anzaldúa is co-author of *This Bridge Called My Back*, *Borderlands: The New Mestiza*, and most recently, the children's story "The Ghost Woman's Gift."

Me cambio a mi misma(o), y cambio el mundo.

— Gloria Anzaldúa

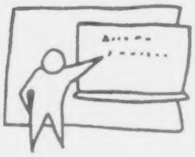


Welcoming (10 minutes)

Welcome students and take attendance. Tell them that today they will be taking a ***census**. Ask if anyone remembers what a census is from the last lesson, and would like to explain it to the class for review. Make sure the purpose of a census is reviewed before moving on to the activity. For example, ask if anyone thinks they know how the United States can count exactly how many people are living in the country. The population in the United States is over 250 million people — ask if anyone thinks they can count that high. Tell students that today they will learn how a ***census** is taken, and how we can learn information about a ***population**.

Homework/Learning Options (45 minutes)

Students may use this time to complete homework, engage in free reading, or do any other program-related academic activity.



Curriculum

Census Sweet Census (30 minutes)

Show the students a clear plastic bag which contains all of the individual packages of Gummi Bears™ or other material you have chosen to use in this activity.

Tell them:

"This is the ***total population** of Gummi Bears™ which you will be working with today. Can any of you think of a way to find out quickly how many Gummi Bears™ of each color there are in the total population of Gummi Bears™?"

Dígale a los alumnos:

"Esta es la ***población** total de Gummi Bears™ que van a usar hoy. ¿Pueden pensar en una manera rápida de calcular cuántos Gummi Bears™ de cada color hay en la población total?"

Students will probably suggest counting all of the candies. Ask students to suggest other ways of determining the total number of each color of Gummi

Bears™ besides counting every piece. If students do not offer the idea of taking a ***sample**, suggest the following:

"Why don't we use one bag as a ***sample** that represents the total population of Gummi Bears™? Instead of counting the total number of every color of all of the Gummi Bears™, let's just look at some of the Gummi Bears™, and pretend that they represent the entire bag — this is called using a ***sample**."

"¿Para representar la población total porqué no tomamos de ***muestra** una bolsa de Gummi Bears™? En vez de contar el número total de cada color de Gummi Bears™ vamos a fijarnos sólo en una parte de la cantidad total, y hacer de cuenta que esta parte representa la bolsa entera — a esto se llama usar una ***muestra**".

Divide the class into their cooperative learning groups, making sure that each group has a copy of Handout 35.1, a piece of paper, and a pencil. Distribute one package (a ***sample**) of Gummi Bears™ to each group.

Tell the groups:

"Open your ***sample** of Gummi Bears™, and sort the Gummi Bears™ by color. Now, using the graph, you will show how many bears of each color are in your ***sample** package. Starting with the red Gummi Bears™ put an 'X' in a box for every red Gummi Bear™ in your sample, using the red marker. Next, count the green Gummi Bears™, and put an 'X' in a box for every green Gummi Bears™ using the green marker. Next, do the orange and then the yellow. This is like the other charts you have made."

Dígale a los alumnos:

"Abran su ***muestra** de Gummi Bears™ y sepárenlos por color. Ahora, usando la gráfica, van a apuntar cuántos Gummi Bears™ de cada color hay en su ***muestra**. Empezando con los rojos, pongan una 'X' en cada cuadro por cada Gummi Bear™ rojo, usando un marcador rojo. Luego, van a hacer lo mismo con los verdes, los anaranjados y los amarillos".

After allowing time for the groups to construct their own graphs, ask students to think about what the graph is telling them.

Ask the groups:

What does your graph tell you? [The graph shows the number of each color of bears in one sample, the number of one color compared to another, and the total number of bears in that sample]. Based only on your group's graph, can your group ***predict** the number of bears of each color that are in the room and the total number of Gummi Bears™ — all the colors together — that are in the room?"

Pregunte a los alumnos:

"¿Qué nos dice la gráfica? [El número de osos de cada color en una muestra, el número de un color comparado con otro, y el número total de osos en esa muestra]. Ahora, basándose sólo en la información de la gráfica de su grupo, ¿pueden pronosticar el número de Gummi Bears™ de cada color que hay en el salón? ¿Y el número total de Gummi Bears™ — de todos los colores — que hay en el salón?"

After giving the groups time to confer, record group predictions for each color and for the total on the chart you have prepared. Label this chart, "Gummi Bear™ Prediction #1." Have students compare the ***predictions** which were made by each group, discuss the differences, and analyze why those differences exist. [The predictions were based on a small sample of the total number of Gummi Bears™. Each sample may have had a different distribution of each color].

Ask students how they think they can make the predictions more precise. [Point out the need for a larger sample]. After suggesting the need for a larger sample, have each group join with one other group and combine their Gummi Bears™. Ask them to make a new graph showing the distribution of colors in the larger sample. Based on the new graphs, have students make and record a second prediction of each color group and the size of the ***total population** on another chart titled, "Gummi Bear™ prediction #2."

Ask students:

"Were these predictions different from your first prediction? Why? [Predictions based on larger sample]. How do you think you can check how accurate or good your predictions are?" [Count all bears one by one or add the groups' totals for each color.]

Pregunte a los alumnos:

"¿Fue diferente esta prediccón de la primera que hicieron? ¿Por qué? ¿Comó creen que pueden comprobar sus predicciones?"

Help students count all the bears or add totals from the group. Record the results beneath the predictions. Ask students to discuss their predictions.

Then, ask:

"Which sample — the smaller sample or the larger sample — was most like the real or true population of Gummi Bears™ of each color? Why do you think so?"

Pregunte a los alumnos:

"¿Cuál fue la muestra más parecida a la población actual de Gummi Bears™ de cada color — la chiquita o la grande? ¿Por qué creen que sea así?"

Discussion (15 minutes)

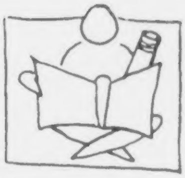
Tell students:

"You just used three procedures to find out about a population of Gummi Bears™. First, you examined a small **sample* and made a prediction about the entire population. Next, you looked at a larger sample and made new predictions. Finally, you conducted a **census* by counting all the bears to get accurate information about the total population. Scientists who work with numbers and statistics follow these same three steps to find out about other populations."

Dígale a los alumnos:

"Acaban de usar tres métodos para aprender algo sobre la población de Gummi Bears™. Primero, usaron una ***muestra** chiquita y luego hicieron una predicción acerca de la población total. Después vieron una muestra más grande para hacer otras predicciones. Finalmente, levantaron un ***censo** contando todos los Gummi Bears™ para obtener información exacta acerca de la población. Los científicos usan los mismos métodos".

Remind students that in the last lesson they learned that the United States took a census in 1990 and counted over 250 million people. Inform the students that, at the same time, the United States used a sample to gather information about the population in this country. The United States took a **census* by counting everybody who lives in the country. At the same time, they sent out questionnaires to a **sample* of the population to get more information about the people living here. Only some people in the population received this questionnaire — they formed a **sample* population. Tell students that most countries in the world take a census — even China, which has a population of over one billion people. End the discussion by asking students if they can think of anything they would want to learn about the population in Academia. Ask if they could learn these things by taking a sample, and not asking the entire population, or if they should take a census of the entire population (i.e. age of students, favorite color of students, number of boys, number of girls, etc.).



Journal (15 minutes)

Have students brainstorm information they are interested in gathering about the population at Academia. Have them write these questions in their journals. They can use some of the ideas suggested in the discussion. After they write some questions down, have them predict some responses by writing a paragraph. Allow students to draw a picture that represents these predictions.

Closing (5 minutes)

Review how a census, sample, or a population is connected to the concept of ***balance**. Are there enough resources for the entire population? Can too many people throw an ecosystem off balance?

Parent Link

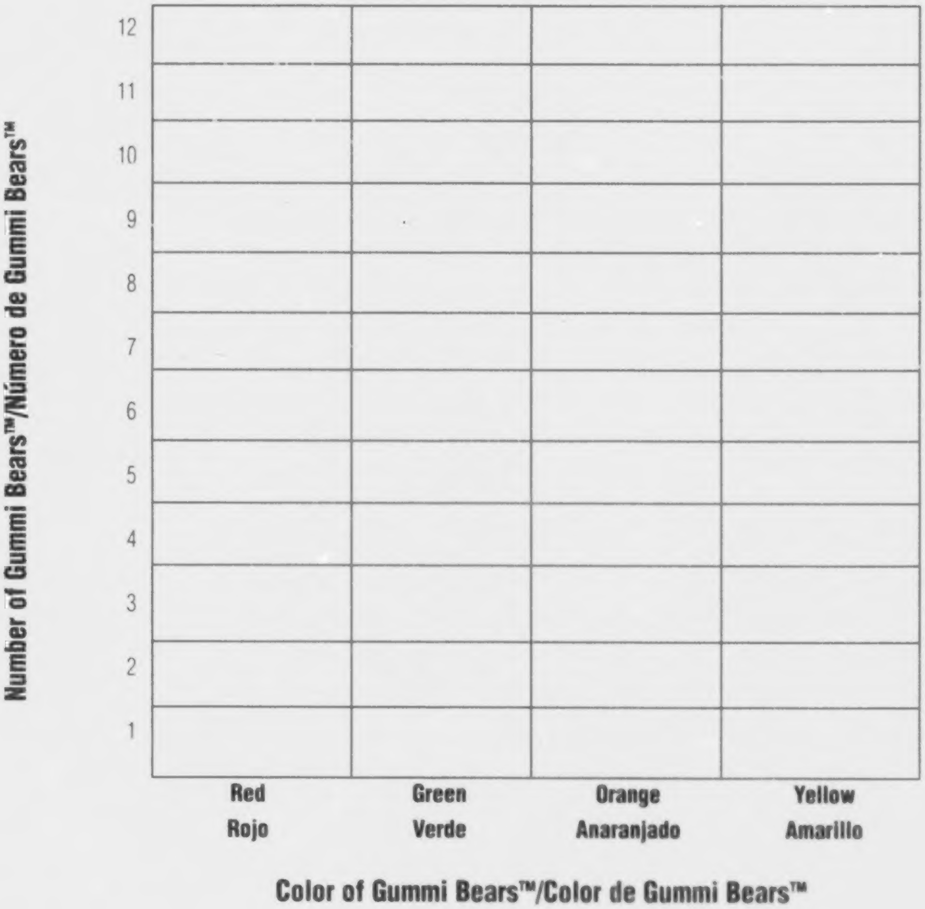
Pond Sample. Review and explain the family activity that appears as Handout 35.2 before sending it home with students. Explain to students (and parents, if you can) not to worry if they don't have a microscope at home. Science is about observing, and the idea of this exercise is that they get a chance to do that. If microscopes are not available at your Academia site, you might want to contact a nearby school in your neighborhood to let you keep one on loan for a day. A follow-up activity to this would involve having students bring in their samples to school and having a chance to look at the "hidden populations" inside the pond water.

Enlace familiar

Muestra de agua de un estanque. Revise y explique la actividad familiar que aparece en la Hoja de trabajo 35.2 antes de mandarla a casa con los estudiantes. Explique a los estudiantes (y padres si es posible) que no se preocupen si ellos no tienen un microscopio en la casa. La ciencia se trata de la observación y la idea de éste ejercicio es que ellos tengan la oportunidad de hacer esto. Si no tiene microscopios en Academia, usted podría contactarse con una escuela cercana en el vecindario para tomar prestado un microspopio por un día. Una actividad de seguimiento para este ejecicio es que los estudiantes traigan muestras de agua a la escuela para que tengan la oportunidad de observar la "población oculta" que vive dentro del agua de un estanque.

Handout 35.1

The Gummi Bear™ Population
La población de Gummi Bears™



Handout 35.2

Parent Link Family Activity Pond Sample*

What kinds of things can be found in pond water? This activity will help you and your family find out. You will need an adult helper and the following materials before you can begin your activity:

☆ Pond water (you must have access to a pond).
☆ Plastic pail.
☆ Clear plastic bowl.
☆ Magnifying lens.
☆ Your family nature walk journal.

With your adult helper, carefully scoop up some pond water with the plastic pail. Pour the water into the plastic bowl. After a few moments, the heavier materials should fall to the bottom of the bowl, and you should be able to see some of the things that live in the water. Use the magnifying lens to inspect the materials in the bowl. What do you see?

Weeds, insects, and other tiny water creatures (such as "hydras") are generally found in pond water. You may even have scooped up a tadpole or a small fish. Jot down your observations in your family nature walk journal. Some of the living things may be too small to see even with a magnifying lens. If you have a microscope, try putting some of the pond water on a slide to see if you can spot any more creatures moving around.

When you are finished with your inspection, return your water creatures and the remaining water to the pond.

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* This activity was adapted from Jean Potter's Nature in a Nutshell for Kids.

Hoja de trabajo 35.2

Muestra de agua extraída de un estanque

¿Qué cosas se puede encontrar en el agua de un estanque? Esta actividad les ayudará a ustedes y a su familia a descubrirlas. Usted necesitará una persona adulta para que lo ayude y también necesitará los siguientes materiales antes de empezar con esta actividad:

- ☆ Agua de estanque (usted debe tener acceso a un estanque).
- ☆ Un recipiente claro de plástico.
- ☆ Su diario de un paseo familiar al campo.
- ☆ Un balde de plástico.
- ☆ Una lupa.

Con la ayuda de una persona adulta, saque cuidadosamente con el balde de plástico un poco de agua del estanque. Eche esta agua en el recipiente de plástico. Después de unos minutos los materiales pesados caerán en la base del recipiente, y usted podrá ver algunas de las cosas que viven en el agua. Use la lupa para inspeccionar los materiales que están dentro del recipiente. ¿Qué puede ver?

Algas, insectos, y otras criaturas acuáticas pequeñas (tales cómo "hidra") que generalmente se encuentran en el agua de un estanque. Probablemente haya sacado en el agua un renacuajo o un pez pequeño. Anote sus observaciones en su diario familiar de un paseo al campo. Algunos seres vivientes probablemente van a ser muy pequeños para verlos con la lupa. Si usted tiene un microscopio, trate de poner un poco de agua del estanque sobre un portaobjeto para ver si puede encontrar más criaturas que se están moviendo alrededor.

Cuando termine con su inspección, devuelva las criaturas acuáticas y el resto del agua al estanque.

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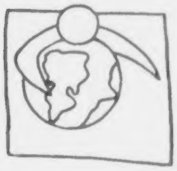
* Esta actividad fue adaptada del libro de Nature in a Nutshell for Kids de Jean Potter

Lesson 36

What Do We Know About Balance?
¿Qué sabemos del equilibrio?



Overview

In this culminating lesson, students review the concepts and vocabulary introduced in the unit while working cooperatively at work stations.

Resumen

En esta lección final los alumnos repasan los conceptos y el vocabulario presentado en ésta unidad al trabajar en forma cooperativa en los centros de trabajo.

Key Skills

Problem-Solving

Recording

Reporting

Writing

Working Cooperatively

Destrezas claves

Resolver problemas

Registrar

Reportar

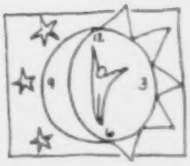
Redactar

Trabajar cooperativamente

Preplanning

1. Make copies of Handout 36.1.
2. Determine which word game students will engage in at Work Station I. Prepare as necessary. Place each group's word bank, pencils, and blank word cards at this work station.
3. For the activity at Work Station III, squeeze the ends of each wire hanger together and bend up, using a pair of pliers. Bend the ends of each hanger up far enough so that each team will be able to hang the cups from each side.

4. Punch four holes just below the rim of each cup. Make sure the holes are evenly spaced around the rim of the cup
5. Create a balance (use instructions provided below) as a model for students working at Work Station II. Make sure there is a place in the room where students can hang their balances. The hanger balances must be able to swing freely. You may need to hammer a long nail or a hook into a wall so that the balances can hang freely.
6. Place the bent wire hangers, string, cups, pennies, and the objects to be weighed at Work Station II.
7. Review Lesson 31's Work Station I: "Circle Poems of Praise..."
8. Review your procedures and rules for work stations with the teaching assistants, assign them to work stations, and make sure each knows his/her responsibilities.
9. Determine which roles should be assigned to cooperative learning team members for this lesson. Suggestions include the following: Recorder, Reporter, Gatekeeper, and Praiser.



Suggested Time

10 minutes — Welcoming
45 minutes — Homework/Learning Options
20 minutes — Work Station I: Wordbanks and Vocabulary Games
20 minutes — Work Station II: Revisiting the Balance
20 minutes — Work Station III: *Nuestro mundo creativo*
5 minutes — Closing

2 hours total

Materials

A teacher and teaching assistants are needed to fully implement this lesson. The following materials are needed:

- Handout 36.1, "Unit Review of Vocabulary."
- Wire hanger (one per team).
- An 8-ounce plastic cup or yogurt container (two per team).
- 50 - 100 pennies.
- A number of small, odd objects for weighing — paper clips, pens, pencils, an eraser, a crumpled piece of paper, and the like.
- Pieces of string approximately 16-inches in length (four pieces per team).
- Blank 3" x 5" index cards for wordbanks.
- Paper and pencils, and colorful markers or pens.

- ☆ Scratch paper.
- ☆ Handmade sheet paper (one per student) from Work Station III in Lesson 31.

Suggested Quote/Cita sugerida

The following quote or one of your choosing, may be useful to initiate or continue discussions about ideas that are important in this unit and these lessons.

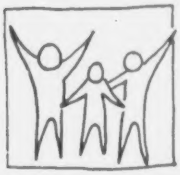
I change myself, I change the world.

— Gloria Anzaldúa, as quoted in *The Fire in Our Souls*

Ms. Anzaldúa is co-author of *This Bridge Called My Back, Borderlands: The New Mestiza,* and most recently, the children's story "The Ghost Woman's Gift."

Me cambio a mi misma(o), y cambio el mundo.

— Gloria Anzaldúa



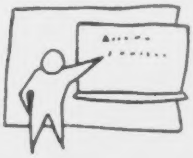
Welcoming (10 minutes)

Welcome students and take attendance. Provide a few minutes for each cooperative learning team to chart their recycling contributions. Choose a student volunteer to chart the recycling contributions to the class.

Tell students that they will be working at work stations today. Review work station procedures with the class, if necessary. Before work at each work station begins, tell them that today they will be reviewing the concept of balance. Remind them that this is what they have been studying throughout this unit. When an animal becomes extinct, or when there isn't enough of a basic essential element — food, water, space, shelter or air — for every living thing, nature is thrown off balance. People play an important role in maintaining the balance. They are connected to the environment in many ways; for example, through watersheds. Tell students that today they will have an opportunity to solve a "balance" puzzle.

Homework/Learning Options (45 minutes)

Students should use this time to complete homework assignments, receive individualized tutoring, or engage in free reading.



Curriculum

Work Stations (20 minutes at each)

Work Station I: Workbanks and Word Games

A teaching assistant should staff this station. Teams will use their wordbanks and the list of key vocabulary, Handout 36.1, as a reference. Provide students at this work station with a few minutes to review the words that have been introduced in the unit and to determine, as a group, which words should be added to their team word bank.

After students have reviewed the vocabulary introduced in the unit, give them an opportunity to reinforce their new knowledge through a word game. Review the procedures for the various word games suggested in Unit 3, Lesson 24 ("Toss-A-Question," "Send-A-Problem," or "Turn-4-Review"). Use one of these word games or one of your own.

Centro de trabajo 1: Banco de palabras y juegos de palabras

Un asistente de maestro debe ser el/la que diriga este centro de trabajo. Los grupos usarán sus bancos de palabras y la lista de palabras claves del vocabulario; use la Hoja de trabajo 36.1 como referencia. Deles unos minutos a los etudiantes en este centro de trabajo para que revisen las palabras que fueron presentadas en la unidad y para determinar como grupo que palabras se van a añadir a su banco de palabras.

Después de que los estudiantes revisen el vocabulario presentado en esta unidad, deles la oportunidad para que refuerzen sus conocimientos por medio de juegos de palabras. Revise las reglas para los juegos de palabras sugeridas en la Unidad 3, Lección 24 ("Haga una pregunta," "Envie un problema" o "Dé la vuelta y repase"). Use su propio juego o uno de los juegos de palabras.

Work Station II: Revisiting the Balance

A teaching assistant should staff this work station. At this works station, each team creates a balance, using the wire hanger, the two plastic cups, and the string provided. Instruct students to thread the ends of two of the pieces of string through opposite holes in the cup and tie, leaving equal length loops. Repeat with the second cup. Hang the two cups on the bent-up ends of the hanger. Then, ask students to find a place in the room to hang the balance where it can swing freely. They will need to experiment with bending the curved top of the hanger until the two ends come to rest at equal heights.

After students have created their balance and have found equilibrium, challenge them to weigh some of the objects that have been gathered. Students can also explore weighing other objects in the room that will fit in the plastic cup. Tell them that in one cup they will place the object and in the other cup they will try to balance that object with pennies. Ask them to discover how many pennies it takes to balance twenty paper clips. What about thirty paper clips? Make sure a team member (the Recorder) is recording the results of each group's experimentation on a piece of paper.

Centro de trabajo 2: Visitando de nuevo el equilibrio

Un asistente de maestro debe ser el/la que diriga este centro de trabajo. En este centro de trabajo cada grupo crea un balance usando un colgador de alambre, dos vasos de plástico y una cuerda. Diga a los estudiantes que hagan pasar las dos puntas de la cuerda por los agujeros opuestos del vaso y que los amarren dejando la distancia entre los agujeros del mismo tamaño. Repita lo mismo con el segundo vaso. Cuelgue los dos vasos en ambos lados del colgador. Luego diga a los estudintes que busquen un lugar en el salón de clases para colgar este objeto balanceado donde pueda balancearse libremente. Ellos tendrán que experimentar para doblar la curva de la parte superior del colgador hasta que ambos lados esten del mismo tamaño.

Después que los estudiantes hayan creado su balance y hayan encontrado el equilibrio, dígales que pesen algunos objetos que han estado reuniendo. Los estudiantes tambien pueden explorar pesando otros objetos del salón de clases que puedan caber en el vaso de plástico. Dígales que en un vaso van a poner el objeto y en el otro vaso van a tratar de equilibrar ese objeto con monedas de un centavo. ¿Qué tal con 20 sujetadores de papel? Asegúrese de que un miembro del grupo (el registrador) este registrando en un papel los resultados de la experimentación de cada grupo.

Suggestion...

Allow students to spend more time weighing objects and finding balance by omitting the construction of the balance from this work station. Ask students to use the balance you created before the lesson as a model to weigh various objects.

Sugerencia...

Permita a los estudiantes que pasen más tiempo pesando objetos y encontrando balance omitiendo la construcción de un balance de este centro de trabajo. Diga a los estudiantes que usen el balance que creó usted como modelo para pesar varios objetos antes de hacer la lección.

Work Station III: *Nuestro mundo creativo*: Prayer or Blessing for Balance

Spoken prayers and blessings are a part of many religions. Many appeal to a higher being, be it a god, or in the case of many Native American traditions, nature. The Tewa prayer from New Mexico that follows in an example of the latter.

> Weave us clothing of great brightness
> That we may walk where birds sing
> and grass grows green.
> Oh, our mother the earth.
> Oh, our father the sky.

Buddhists recite an ancient prayer each day that begins in the following manner:

> May all beings have happiness
> and the cause of happiness.
> May they be free of suffering
> and the cause of suffering.

Remind students what they've learned at Academia about ecological balance; point out, for example, how the actions of humans affect the environment. Remind them of the "circle" of life way of seeing the world they learned about in Work Station I in Lesson 31. Ask them to write down their hopes for humankind, and to give thanks for the bounty of the earth (for example, the food they eat, the water they drink, their families, etc.). Perhaps, you can have them write the prayer/blessing directly to the Earth. What exactly would they say to her if she could hear?

The prayer or blessing should be short (perhaps seven or eight lines). You can have students write their ideas first on scratch paper. Then, have them copy their prayer/blessing over on their handmade sheets of paper with colorful markers, pencils or pens.

Centro de trabajo 3: Nuestro mundo creativo: Plegarias o bendiciones para el balance

Las plegarias y bendiciones en voz alta son parte de muchas religiones. Muchos apelan a un ser supremo, puede ser un Dios, o en este caso, tradiciones de muchos nativos americanos a la naturaleza. La plegaria de Tewa de Nuevo Mexico que tenemos a continuación es un ejemplo.

Téjanos ropa de gran brillo
Que nosotros podamos caminar donde los pájaros cantan
y el césped crece verde.
¡Oh! Nuestra madre es la tierra.
¡Oh! Nuestro padre es el cielo.

Los budistas recitan cada día una plegaria antigua que empieza de la siguiente manera:

Qué todos los seres tengan felicidad
y lo que causa la felicidad.
Qué ellos puedan estar libres de sufrimiento
y lo que causa el sufrimiento.

Recuerde a los estudiantes acerca de lo que ellos aprendieron en Academia sobre el equilibrio ecológico; mencione por ejemplo, como las acciones de los seres humanos afectan al medio ambiente. Recuérdele el "círculo" de la vida y la forma de ver el mundo sobre los que aprendieron en el Centro de trabajo 1 de la Lección 31. Diga a los estudiantes que escriban las esperanzas que ellos tienen para los seres humanos y que den gracias por la generocidad de la tierra (por ejemplo, por la comida que comen, el agua que beben, sus familias, etc.) Quizás consiga que los estudiantes escriban una plegaria o bendición que esté dirigida a la tierra. ¿Qué podrían decirle exactamente a la tierra si ella les pudiera escuchar?

La plegaria o bendición debe ser corta (quizás, 7 u 8 líneas). Puede pedir a los estudiantes que escriban sus ideas primero en un papel de borrador, luego que copien la plegaria o bendición en el papel hecho a mano con marcadores de color, lápices o lapiceros.

Closing (10 minutes)

Review the day's activities with students. Have them share and discuss what they learned in Unit 4, and close the session with a brief reading of the prayers/blessings.

Parent Link

Have students bring their prayers/blessings home to share with their families, and recount what they learned at Academia today. Have them ask parents to share their favorite prayers/blessings with them, and to share any special blessings like the ones they wrote and read at school today that are part of the family's place of origin.

Enlace familiar

Pida a los estudiantes que lleven sus plegarias o bendiciones a casa para compartir con sus familias, y recordar lo que aprendieron hoy en Academia. Diga a los estudiantes que les pidan a sus padres que compartan con ellos sus plegarias y bendiciones favoritas y que también compartan alguna bendición especial como la que escribieron y leyeron en la escuela hoy que sea parte del país original de la familia.

Handout 36.1

Unit Review of Vocabulary

1. ecosystem
2. balance
3. food chain
4. bacteria
5. nutrients
6. watershed
7. ecology
8. drought
9. minimum flow
10. population
11. census
12. sample

Hoja de trabajo 36.1
Repaso de vocabulario

1. ecosistema
2. equilibrio
3. cadena alimenticia
4. bacterias
5. nutrientes
6. vertiente
7. ecología
8. sequía
9. flujo mínimo
10. población
11. censo
12. muestra

UNIT 5

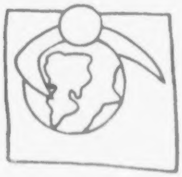
Our Weeping World
Nuestro mundo está llorando

Introduction

In this unit, students continue to explore the relationship between humans and the environment, and learn about the impact of their actions. They are presented with an opportunity to discuss some of the challenging environmental issues of the day. Besides discussing air, land, and water pollution, waste disposal, and ozone depletion, students attempt to provide solutions to these problems. In the first three lessons, they are introduced to the chemicals and pollutants that exist in the air we breathe. This section of the unit ends with a discussion of how the mixture of gases and chemicals in the Earth's atmosphere is causing the Earth to become warm. In the last three lessons, students explore the problems of soil erosion and waste disposal.

Introducción

En esta unidad, los alumnos siguen estudiando la relación entre los seres humanos y el ambiente. Aprenden cómo sus acciones impactan o afectan al ambiente. También tienen la oportunidad de discutir algunos asuntos ambientales de actualidad. Además de discutir los problemas de la contaminación del aire, la tierra, y el agua, la disposición de desechos, y el agotamiento de la ozona, los alumnos tratan de encontrar soluciones. En las primeras tres lecciones se les presenta el tema de los contaminantes químicos que existen en el aire que respiramos. Esta sección de la unidad termina con el tema de cómo la combinación de gases y substancias químicas en la atmósfera de la Tierra está haciendo que la Tierra se caliente. En las últimas tres lecciones, los alumnos exploran los problemas de la erosión de la tierra y la disposición de los desechos.



Overview

Lesson 37: What's Polluting Our Air

This lesson introduces students to some of the common gases and chemical pollutants that fill our air. Students build a "pollution trap" and write about their findings.

Lesson 38: Counting On Cars

By focusing on the use of automobiles, students gain a greater understanding of how the air we breathe may become polluted. They tally the number of cars that drive by in a given number of minutes, and explore how traffic contributes to air pollution.

Lesson 39: Trapping Pollution

In this lesson, students return to their "pollution traps" and continue to explore the concept of air pollution. They compare their predictions to actual findings.

Lesson 40: The Queen of Chalk

This lesson continues the discussion on air pollutants and introduces the problem of acid rain. Students learn how acid rain develops, and witness the damage it can create. They also discuss possible solutions to this problem.

Lesson 41: Global Warming: Inside the Greenhouse (Part I)

The greenhouse effect has become extremely important because of its association with global warming. In this lesson, students explore what "global warming" is all about, including the resulting "greenhouse effect." They learn how this effect works, and predict what the consequences will be if it worsens.

Lesson 42: Global Warming: Inside the Greenhouse (Part II)

In this lesson, students continue learning about global warming and the greenhouse effect. They work together to analyze and interpret data, and synthesize information into a report on global warming.

Lesson 43: The Watering Can

In this lesson, students learn about soil erosion and the conditions under which it occurs. They perform a soil erosion test and investigate the rate at which soil absorbs water within particular environments.

Lesson 44: Down In The Dumps

Waste disposal in this country has become a major problem. In this lesson, students discuss the various ways in which we dispose of our trash. They learn why landfill disposal might not be the best solution for getting rid of our trash. By creating their own landfill and observing how trash degrades over time, students make this discovery.

Lesson 45: Work Stations

In this culminating lesson, students work in cooperative learning teams at work stations to review the concepts and vocabulary introduced in the unit.

Resumen

Lección 37: ¿Qué está contaminando nuestro aire?

En esta lección los alumnos estudian algunos de los gases comunes y los contaminantes químicos de los que está lleno nuestro aire. Construyen una "trampa de contaminación" y escriben acerca de sus investigaciones.

Lección 38: Contamos con los carros

Al enfocarse en el uso del automóvil, los alumnos comprenden mejor cómo se puede contaminar el aire que respiramos. Llevan la cuenta del número de carros que pasan en cierta cantidad de minutos e investigan cómo el tránsito contibuye a la contaminación del aire.

Lección 39: Atrapamos la contaminación

En esta lección los alumnos vuelven a sus "trampas de contaminación" para seguir estudiando la contaminación del aire. Comparan sus predicciones de los resultados con los resultados reales.

Lección 40: La reina de la tiza

Esta lección sigue explorando el tema de la contaminación del aire y presenta el problema de la lluvia ácida. Los alumnos aprenden cómo se produce la lluvia ácida y observan el daño que puede causar. También discuten posibles soluciones al problema.

Lección 41: El calentamiento global dentro del invernadero (Parte I)

El "efecto de invernadero" se ha vuelto muy importante porque se asocia con el calentamiento global. En esta lección, los alumnos estudian de qué se trata esto, incluyendo el resultado del "efecto de invernadero". Aprenden cómo funciona este efecto y hacen predicciones sobre las posibles consecuencias si llega a empeorar.

Lección 42: El calentamiento global dentro del invernadero (Parte II)

En esta lección los alumnos siguen estudiando el calentamiento global y el "efecto de invernadero". Trabajan juntos al analizar e interpretar datos, y sintetizan la información en un reporte sobre el calentamiento global.

Lección 43: La regadera

En esta lección los alumnos estudian la erosión de la tierra y las condiciones en que ocurre. Hacen una prueba de erosión de la tierra e investigan cómo absorbe agua la tierra en un ambiente específico.

Lección 44: ¡A la basura no!

En este país la disposición de desechos se ha convertido en un problema serio. En ésta lección los alumnos estudian diferentes maneras de disponer de la basura. Aprenden porqué los vaciaderos de desechos no son la mejor solución. Al crear su propio vaciadero y observar cómo se degrada la basura a través del tiempo, los alumnos hacen este descubrimiento.

Lección 45: ¿Qué hemos aprendido?

En esta lección final los alumnos trabajan en sus equipos de aprendizaje cooperativo en centros de trabajo para repasar los conceptos y el vocabulario presentados en la unidad.

Objectives

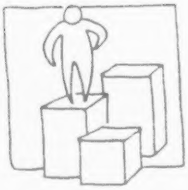
By the end of the unit students will be able to:

1. Identify and distinguish between life-sustaining gases and chemical pollutants.
2. Tally objects.
3. Understand the effects of acid rain on monuments and the environment.
4. Understand the terms "global warming" and "greenhouse effect."
5. Graph given points onto a graph.
6. Make predictions on the effects of global warming.
7. Perform a soil erosion test.
8. Make suggestions for the prevention of soil erosion.
9. Describe how a landfill works and discuss why it isn't a permanent solution to our waste disposal problems.

Objetivos

Al terminar la unidad, los alumnos podrán:

1. Identificar y diferenciar entre los gases que propician la vida y los conta-minantes químicos.
2. Llevar una cuenta de objetos.
3. Comprender cómo afecta la lluvia ácida a los monumentos y al medio ambiente.
4. Comprender los términos: "calentamiento global" y "efecto de invernadero".
5. Hacer una gráfica con los informes recibidos.
6. Hacer predicciones acerca del calentamiento global.
7. Hacer una prueba de erosión de la tierra.
8. Hacer sugerencias para prevenir la erosión de la tierra.
9. Explicar cómo funcionan los vaciaderos y porqué no pueden ser la solución permanente al problema de la disposición de desechos.



Operating Grade Level

All activities in this unit are appropriate for students in grades 3-5. Be sure to read over each lesson to see if specific activities need to be simplified or modified to fit the needs, interests and skills of the students in your group.

Nivel de grado

Todas las actividades de esta unidad son apropiadas para los grados 3-5. Asegúrese de leer cada lección para ver si hay que cambiar o modificar alguna actividad específica para que esté de acuerdo con las necesidades, los intereses, y las capacidades de los alumnos de su grupo.

Suggested Quote/Cita sugerida

I hope you will go out and let stories happen to you, and that you will work them, water them with your blood and tears and your laughter till they bloom, till you yourself burst into bloom. Then you will see what medicine they make, and where and when to apply them.

— Clarissa Pinkola Estes as quoted in *The Fire in Our Souls*

Ms. Pinkola Estés is a writer, Jungian analyst, and specialist in cross-cultural mythology. She is the author of several books, including *Women Who Run with the Wolves.*

Espero que salgas al mundo y permitas que te pasen historias, que trabajes con ellas, que las riegues con tus lágrimas, sangre, y carcajadas hasta que estas florescan, hasta que tú misma(o) brotes cómo una flor. Después verás que medicina hacen y cuando y donde las aplicarás.

— Clarissa Pinkola Estés

You may want to do the following with the quote:

- Introduce the quote to students.
- Ask students to write it on newsprint and place it in a visible place such as the wall.
- Talk about the author.
- Brainstorm possible meanings and ways in which those meanings apply to the unit and to the lives of students, their families or communities.
- Ask students if the quote reminds them of something their parents, grandparents or other family members would have said or agreed with.
- Ask students to re-state the quote in their own words (individually or in a group).
- Look for opportunities to relate the quote to language arts activities or "Our Creative World" activities in work stations.
- Create a class "quote file" to which students can add quotes from this curriculum and those that their parents, grandparents or other family members may share with them during the course of Academia.
- Ask students and adults to send in favorite sayings or proverbs of friends or family members, lyrics from songs, passages from books, original contribu-

tions, that relate to math and science and nature or the environment, or to themes like perseverance, courage, determination, inspiration, identity, uniqueness or diversity.

Usted podría hacer lo siguiente con la cita:

- ☆ Introducir la cita a los alumnos.
- ☆ Pedir a los alumnos que escriban la cita en un papel grande y que lo pongan en un lugar visible como la pared.
- ☆ Repasar posibles significados y formas en las que estos significados puedan ser aplicables a la unidad y la vida de los estudiantes, sus familias o comunidades.
- ☆ Preguntar a los alumnos si esta cita les recuerda de algo que sus padres, abuelos, u otros familiares les hayan dicho o con lo cual estarían de acuerdo.
- ☆ Pedir a los alumnos que vuelvan a plantear la cita en sus propias palabras (individualmente o en grupo).
- ☆ Buscar oportunidades para relacionar la cita con las actividades de lenguaje o las actividades de "Nuestro Mundo Creativo" en los centros de trabajo.
- ☆ Crear un "archivo de citas" de la clase al que los alumnos puedan añadir citas de este manual, y los padres, abuelos, u otros miembros de la familia podrían compartir con ellos durante el curso de la Academia.
- ☆ Pedir a los alumnos y personas adultas que manden sus dichos favoritos o proverbios de sus amigos o familiares, letra de canciones, pasajes de libros, contribuciones originales, que estén relacionados con ciencias o matemáticas, la naturaleza o el medio ambiente, o a temas como perseverancia, valentía, determinación, inspiración, identidad, singularidad o diversidad.

Cultural Link

One of the phenomena related to global warming that scientists are studying has its roots in the pacific coast of Peru. Usually, around Christmas time, the waters off Peru begin a rapid warming trend. Because this trend takes place at this time of the year, the pheonomena was coined with the name of "El Niño," after the Christ child.

Over the past years, "El Niño" has often been blamed for all kinds of extreme weather worldwide. It has been common practice, during a few weeks of deluge or drought, to find weather reporters saying "the heavy rain was caused by 'El Niño,'" or "It's dry because of 'El Niño.'" In the 1980s, a bubonic plague outbreak in the southern California rodent population was actually blamed on "El Niño."

"El Niño" is a tropical weather situation that, prior to the 1980's, was of interest to only tropical weather specialists. Things changed in 1982, when a strong and prolongued "El Niño" trend was examined as a probable cause of weather extremes across the globe. Scientists thought that they had found a specific and recurring weather event that could be linked to and predict global weather.

Scientists are still divided on the extent that "El Niño" is changing global temperatures. The average U.S. citizen, however, is hearing a lot more about "El Niño" from local weather people during the late winters months.

Enlace Cultural

Uno de los fenómenos relacionados con el calentamiento solar que los científicos estan estudiando tiene sus raices en la costa del pacífico del Perú. Usualmente cerca de las fiestas de navidad, las aguas del mar del Perú comienzan a calentarse rápidamente. Debido a que esto pasa en esta época del año, el fenómeno fue bautizado con el nombre de "El Niño", en honor al Niño Jesús.

En los últimos años, "El Niño" ha sido el causante de todo tipo de mal tiempo alrededor del mundo. Ha sido una práctica común durante unas cuantas semanas de inundación o sequía escuchar a los meteorólogos decir que las fuertes lluvias fueron causadas por "El Niño" o que hay sequía causada por "El Niño". Hasta en los años 1980, al "Niño" se le determinó causante de un brote de peste bubónica en la población de roedores del sur de California.

"El Niño" es una condición tropical que antes de los años 1980s era de mucho interés solamente para los meteorólogos especialistas. Las cosas cambiaron en 1982, cuando una fuerte y prolongada tendencia del "Niño" fue examinada como causa probable de la temperatura extrema del mundo. Los científicos pensaban que ellos encontraron un evento especifico y recurrente del clima que podía ser asociado con los pronósticos del tiempo mundial.

Los científicos aún no llegan a ponerse de acuerdo sobre el grado en que "El Niño" está afectando la temperatura mundial. El ciudadano americano corriente, de cualquier manera, está escuchando más a menudo acerca de "El Niño" de los reporteros locales del tiempo durante estos últimos meses de invierno.

Parent Link Summary

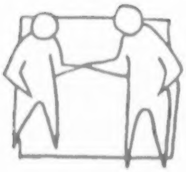
Parent Links attempt to help make meaningful connections between what students learn at Academia and the world around them. In this unit, students continue to learn about the relationship between humans and their environment. They address important environmental issues and attempt to come up with solutions for them. This unit's Parent Links address that relationship.

Encourage students to write, draw or talk about what they learned from their parents in the previous lesson's Parent Link during the Daily Homework/ Learning Option. Whenever possible, collect students' writing, drawings or projects to share at the PAP meetings, to display on a bulletin board at the end of the unit, or to be acknowledged in other ways.

Resumen de enlaces familiares

La intención de los enlaces familiares es de ayudar a hacer conecciones significativas entre lo que los estudiantes aprenden en Academia y el mundo que los rodea. En esta unidad los estudiantes aprenden acerca de cómo los seres humanos se relacionan con el medio ambiente. Ellos enfocan temas importantes del medio ambiente e intentan encontrar soluciones para estos problemas. El enlace familiar de esta unidad se enfoca en esta relación.

Incentive a los estudiantes a escribir, dibujar o hablar acerca de lo que han aprendido de sus padres en los enlaces familiares de las lecciones previas durante la opción de tarea para la casa. Siempre que sea posible, recoja lo que los estudiantes escribieron, dibujaron o los projectos que hicieron para compartir con los padres en la reunión de padres, para exhibirlos en el tablero informativo al final de la unidad, o para que sean reconocidos de otras formas.



Parents as Partners Link

In this session, parents explore the destructive consequences of human behavior, and human pollution of precious resources. For this session, the PAP coordinator will focus on pollution [illegible] destruction caused by acid rain, and explore the effects of global warming.

Many of our students come from working class neighborhoods and are surrounded by plants and industries. They have watched and smelled daily contaminants go into the air. Many of our neighborhoods are also dissected by highways and railroad tracks. For decades, cars, trucks and trains have spilled poisons into our immediate surroundings. Many of our students and their parents are victims of an environmental racism that puts economically disadvantaged people in the direct path of destructive pollutants and toxins. Many of these impurities rise into the air and return back to earth as corrosive acid rain.

To illustrate this concept, utilize Lesson 40: "The Queen of Chalk." In this lesson, participants will be handed a piece of chalk and a small nail. Using the nail they will carve a figure in the chalk. Give parents ample time to get creative with their carvings. The more intricate the design, the greater the impact will be when their statues are slowly destroyed by the acidic vinegar that will be poured on them. This lesson will leave a strong impression on parents of the corrosive effects of acid rain.

For this session, it would be helpful to invite a local television weather personality.

Many weather reporters are actually trained meteorologists and can answer a great deal of questions involving the environment. Another topic that could be explored in this presentation is global warming, which is also covered in this unit. Latin America is important to this topic because several concerns related to this issue have a basis here. The loss of the Amazonian rainforests and the warming ocean currents of the coast of Peru, known as "El Niño," are affecting temperatures around the world. This focus also gives the issue a cultural slant with which participants can readily identify.

The issues of pollution in the participants community is an area that can be used as a scientific learning experience for the entire family. As a group, parents may also identify an environmental problem that is adversely effecting their community.

The Project PRISM handout "Learning Science and Math in Your Community" addresses relevant topics on community environmental issues, and offers helpful advice and strategies to help parents focus in on their neighborhood surroundings. (Please refer to Unit 2, PAP Resource 2.1.) It also encourages parents to discover where waste and trash go in their community, find out where their drinking water comes from, and learn how safe it is to drink.

Suggested resources for this session are:

- Unit 5: "Our Weeping World," overview, and unit objectives.
- Lesson 40: "Queen of Chalk."
- Materials: Sidewalk chalk, nails, paper plates, vinegar.
- Guest: Local television meteorologist.
- Project PRISM's PAP Resource 2.1, "Learning Science and Math in Your Community."

Reunión de padres

En esta reunión los padres exploran las consecuencias destructivas que resultan del comportamiento humano, y la contaminación de recursos valiosos que estos causan. Para esta reunión, el coordinador de la reunión de padres se enfocará en el tema de la contaminación por medio de la destrucción causada por la lluvia ácida y se explorarán los efectos del calentamiento global.

Muchos de los estudiantes vienen de vecindarios de gente que trabaja y que están rodeadas de plantas e industrias. Ellos han visto y olido diariamente los contaminantes que van al aire. Muchos de nuestros vecindarios estan divididos

por carreteras y rieles de tren. Por décadas, los automóviles, camiones, y trenes han echado sustancias venenosas en nuestros alrededores. Muchos de nuestros estudiantes y sus padres son víctimas de la discriminación ambiental. Esta los pone en un plano económico de gente desventajada, en camino directo de contaminantes y toxinas destructivas. Muchas de estas impurezas se elevan al aire y regresan a la tierra como lluvia ácida corrosiva.

Para ilustrar este concepto utilize la Lección 40: "La reina de la tiza". En esta lección se les proporciona a los participantes un pedazo de tiza y un clavo pequeño. Usando el clavo ellos tallarán una figura en la tiza. Déle a los padres un tiempo amplio para que usen creatividad en sus tallados. Mientras más complejo el diseño, más el impacto profundo cuando sus estatuas sean destruídas por el ácido del vinagre que se le echará encima. Esta lección dejará a los padres muy imprecionados al ver el efecto de la corrosividad de la lluvia ácida.

Para esta sesión seria muy útil invitar a un meteorólogo local de televisión. Muchos reporteros del tiempo son entrenados cómo meteorólogos y pueden responder a muchas preguntas que involucran el medio ambiente. Otro tema que se puede explorar en esta presentación es el calentamiento mundial, el cual se cubre también en esta unidad. Es importante hablar de Latino América en este tema porque muchas preocupaciones estan relacionadas con este tema y es donde tiene la base. La pérdida de la forestación del Amazonas y el calentamiento de las corrientes del océano de las costas del Perú conocidas como "El Niño" estan afectando la temperatura del ambiente alrededor del mundo. Este tema también muestra un ángulo cultural el cual los participantes pueden identificar con facilidad.

El tema de la contaminación en la comunidad de los participantes es un tema que se puede usar como una experiencia científica de aprendizaje para toda la familia. Los padres en grupo pueden identificar un problema ambiental que esté afectando adversamente a su comunidad.

La hoja de trabajo del projecto PRISM titulada "Aprendiendo ciencias y matemáticas en su comunidad" enfoca temas relacionados con el medio ambiente de la comunidad, y ofrece consejos útiles y estrategias que ayudan a los padres a enfocarse en los alrededores de su vecindario. (Por favor refiérase a la Unidad 2, Recurso para reunión de padres 2.1.) Tambien incentive a los padres a que investiguen dónde se depositan los desechos y la basura de su comunidad, de dónde viene el agua que toman y si es saluble tomarla.

Se sugieren los siguientes recursos para esta sesión:

- ☆ Unida 5: "Nuestro mundo está llorando" el resumen y los objetivos de la unidad.
- ☆ Lección 40: "La reina de la tiza".

- ☆ Materiales: Tizas gruesas, clavos, platos de papel, vinagre.
- ☆ Invitado: Meteorólogo local de televisión.
- ☆ Hoja de Recurso para reunión de padres 2.1 del projecto PRISM, "Aprendiendo ciencias y matemáticas en su comunidad".

Lesson 37

What's Polluting Our Air?
¿Qué está contaminando nuestro aire?

Overview

This lesson introduces students to some of the common gases and chemical pollutants that fill our air. Students build a "pollution trap" and write about their findings.

Resumen

En esta lección los alumnos estudian algunos de los gases comunes y los contaminantes químicos de los que está lleno nuestro aire. Construyen una "trampa de contaminación" y escriben acerca de sus investigaciones.

Key Skills

Making observations

Experimenting

Making predictions

Drawing conclusions

Writing

Destrezas claves

Observar

Experimentar

Hacer predicciones

Sacar conclusiones

Redactar

Preplanning

1. Read "Background for the Teacher."
2. Review the following terminology:

* *pollution*	* *contaminación*
* *oxygen*	* *oxígeno*

* *nitrogen*	* *nitrógeno*
* *carbon dioxide*	* *bióxodo de carbono*
* *invisible*	* *invisible*
* *fossil fuels*	* *combustibles de fósil*
* *smog*	* *smog*

Background for the Teacher

Harmful gases and solid particles that are emitted in the air by motor vehicles, generators, houses, and industries bring about air pollution.

***Fossil fuels**, especially carbon, emit pollutants when they burn. Sulphur, which is found frequently in carbon, combines with oxygen and produces a smoke with an unpleasant odor. When the carbon burns, it also emits a great amount of soot, or particles of unburned carbon. At the beginning of the century, some industries changed their source of energy from carbon to petroleum — which burns cleaner — and natural gas. As a result, the air became cleaner.

Years later, with increased use of the automobile, other forms of pollutants were introduced into the atmosphere. The motor of a car does not burn gasoline completely. As a result, carbon monoxide and hydrocarbons are mixed with the air. Various compounds of nitrogen and sulphur are also produced. All these substances are toxic or poisonous. The pollutants which are produced from cars go through chemical reactions in the air and form **smog*. The sun provides the energy for these chemical reactions.

Smog and other forms of pollution can be reduced. Today's more efficient car motors burn the gasoline in a more complete form. Filters in chimneys can trap soot and other particles which form smog.

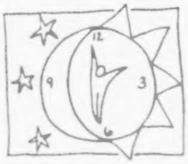
Información para el/la maestro/a:

Los gases dañinos y las partículas sólidas emitidas al aire por motores de vehículos, plantas eléctricas, casas, e industrias causan la contaminación del aire.

Al quemarse, ***los combustibles de fósil**, sobre todo el carbón, emiten contaminantes. El azufre, que con frecuencia se encuentra en el carbón, se combina con el oxígeno y produce un humo de olor desagradable. Al quemarse el carbón, también emite una gran cantidad de hollín, o partículas de carbón sin quemar. A principios del siglo, algunas industrias cambiaron su fuente de energía del carbón al petróleo — que se quema más limpiamente — y al gas natural. El aire se volvió más limpio.

Años más tarde, al usarse más el automóvil, se empezaron a introducir a la atmósfera otras formas de contaminantes. El motor de un automóvil no quema completamente la gasolina. Como resultado, el monóxido de carbono y los hidrocarbonos se mezclan con el aire. También se producen varias combinaciones de nitrógeno y azufre. Todas estas sustancias son tóxicas o venenosas. Los contaminantes producidos por los automóviles pasan por reacciones químicas en el aire y forman el ***smog**. El sol provee la energía para estas reacciones químicas.

El ***smog** y las demás formas de contaminación se pueden reducir. Los motores de automóvil más eficientes queman la gasolina de una manera más completa. Los filtros de chimeneas pueden atrapar el hollín y otras partículas que producen el ***smog**.



Suggested Time

10 minutes — Welcoming
45 minutes — Homework/Learning Options
15 minutes — Guided Discussion
30 minutes — Pollution Trap Activity
15 minutes — Journal and Debriefing
5 minutes — Closing

2 hours total

Materials

A teacher and teaching assistant are needed to fully implement this lesson. In addition, the following materials will be needed:

- Room freshener or other spray scent.
- Heavy paper or cardboard.
- Scissors.
- One or two rolls of wide and clear, sticky tape (at least 1 ½" wide).
- String.
- A magnifying glass and hole puncher.

Suggested Quote/Cita sugerida

I hope you will go out and let stories happen to you, and that you will work them, water them with your blood and tears and your laughter till they bloom, till you yourself burst into bloom. Then you will see what medicine they make, and where and when to apply them.

—Clarissa Pinkola Estes as quoted in *The Fire in Our Souls*

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> *Espero que salgas al mundo y permitas que te pasen historias, que trabajes con ellas, que las riegues con tus lágrimas, sangre, y carcajadas hasta que estas florescan, hasta que tú misma(o) brotes como una flor. Después verás que medicina hacen, y cuando y donde las aplicarás.*
>
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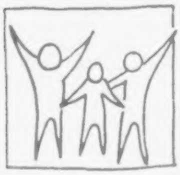


Welcoming (10 minutes)

Welcome students, take attendance and assign a member of each cooperative learning team to chart the groups' recycling efforts for the week. Also, select a student to chart the total class recycling effort. Introduce the topic for the day by asking students if they can recall the five basic needs of all living things. Tell students that they will be talking about one of those essentials elements: air. Explain to students that air is made up of different gases mixed together. Some gases and chemicals are ***invisible**. To illustrate the idea that there are some things in the air that we can't see, bring some scents that you can wave or spray in the air. Some ideas for scents include: perfume in an atomizer, room freshener, a cleaning spray with ammonia, etc. See if students can describe the smell but more importantly, ask if they can "see" it.

Homework/Learning Options (45 minutes)

Students may use this time to complete homework, receive individual tutoring or assistance, or engage in free reading. Students should also add any new words or terms they've learned today to their team wordbanks.

Curriculum

Guided Discussion (15 minutes)

Work with students in a whole group to introduce the topic of air and air pollution. Tell students that air is made up of different gases. Like the example used in the opening, these gases mix together. The most common gases in the air are ***oxygen** (which our bodies require to stay alive), ***nitrogen** (that most plants require to stay alive), and ***carbon dioxide**. As part of the discussion, ask students the following questions and write down their answers on the board:

Ask Students:

What is air pollution?

How does this affect us? Do you find air pollution only in big cities?

Pregunte a los alumnos:

¿Qué es la contaminación del aire?

¿Comó nos afecta?

¿Se encuentra la contaminación del aire solamente en las ciudades grandes?

Other things, like hydrocarbons, monoxide, sulphur and other chemicals can also get into the air. This makes the air "polluted" even though we can't see these chemicals.

Ask students to name a type of air pollution that they can see. Some types of air pollution that we can see are smoke, ash, and dust which comes in the form of tiny particles. We can see these very clearly in the air. Make sure that students understand that there are also other types of pollution which they can't see, and which they sometimes can't even smell. These are caused by chemicals and gases in the air. Tell students that today they are going to perform an experiment. They will all become "air detectives" and build a trap that will "catch" some of those pollution particles. Tell them that they will be working in pairs.

Air Strip Activity (20 minutes)

Students should be paired up to make their air strips. The teacher should explain the steps described below before the students start working. Make paper or cardboard, scissors, tape, and a hole punch available to each pair of students and give them the following directions:

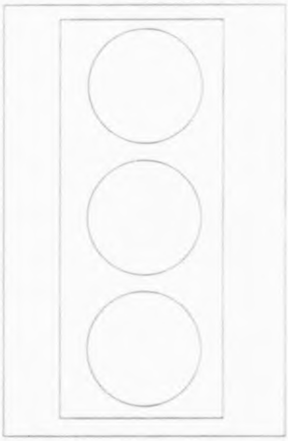
A. Cut a strip of cardboard about 2" wide and 10" long.

B. Cut circles, about 1" round, down the middle of the cardboard strip. Punch a small hole in one end of the strip.

C. Tie a 12-inch long string through the small hole.

D. Remove a long piece of sticky tape and press it down along the cardboard, so it covers the holes. (The tape will be sticky on the underside of the holes). Your trap should look something like Figure 1.

Figure 1



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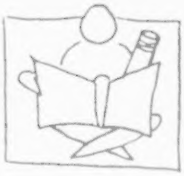
Instrucciones para los alumnos:

A. Recorta una tira de cartón de 2 pulgadas de ancho por 10 pulgadas largo.
B. Atravesando el centro de la tira, recorta agujeros de más o menos 1 pulgada de ancho. Con la perforadora, haz un agujero pequeño en una punta de la tira.
C. Atraviesa el agujero pequeño con un cordón de 12 pulgadas de largo y amárralo.
D. Con una pieza larga de cinta pegajosa, tapa los agujeros de la cinta. (La cinta se sentirá pegajosa a través de los agujeros). Tu trampa se debe ver como en la Figura 1.

Each pair of students must now decide where they should hang their trap. Tell students that they should hang the traps by the strings in different places outdoors. (They might try indoors, too). Tie them to trees, bushes, fences, from an automobile bumper or wherever they suspect the air might be dirty. Leave the traps set for about a week. During this time the air will move past the holes in the trap. Tell students that they will collect the traps after a week.



Journal (15 minutes)

Ask students to predict what they might find in their pollution traps after a week. Have students write their predictions in their journals. They will compare their predictions with their actual findings. To assist students in making their predictions, ask them the following questions:

"What do you think you will find in the various traps you have set? Will some be dirtier than others? Do you think the indoor traps will be dirty? Where do you think the most polluted air will be found? Where do you think the dirt will come from?"

Pregunte a los alumnos:

"¿Qué creen que van a encontrar en las diferentes trampas que han puesto? ¿Algunas se irán a ensuciar más que otras? ¿Creen que las trampas de adentro se van a ensuciar? ¿Dónde creen que van a encontrar el aire más contaminado? ¿De dónde creen que venga la suciedad?"

Closing (5 minutes)

Have a few volunteers read from their journals. Tell the class that, in next week's session, they will check their traps and compare their predictions to actual findings.

Parent Link

Discuss the benefits of public transportation and how cars are too expensive for many people around the world to own. When people share a bus, train, or carpool together, less congestion is created as well as less pollution. In Susan Milord's *All Together Now*, provided as Handout 37.1, different types of mass transit from around the world are discussed. Review the handout with students and have them take it home. They can talk to parents about the method of transportation the family now uses and its impact on the environment, about those that parents have used in the past in other cities, and check out books from the library that provide pictures and information on this topic.

Enlace familiar

Discuta los benificios que brinda el uso del transporte público y cómo alrededor del mundo los automóviles son bastante caros y que no toda la gente puede tener uno. Cuando la gente comparte un bus, tren, o se turna para llevar gente en su automóvil se produce menos congestionamiento y menos contaminación atmosférica. En la lectura de Susan Milord titulada *Todos juntos ahora*, se habla de diferentes tipos de tránsito en masa de alrededor del mundo y se provee como Hoja de trabajo 37.1. Revise la hoja de trabajo con los estudiantes y envie esta a casa. Puede conversar con los padres acerca de los métodos de transportación que la familia usa actualmente y el impacto que tienen estos sobre el medio ambiente, también pueden hablar acerca de la trasportación que han usado sus padres en otras ciudades y pueden sacar libros de la biblioteca que provean fotografías e información acerca del tema.

Literature Link

Susan Jeffers is the illustrator and compiler of *Brother Eagle, Sister Sky: A Message from Chief Seattle*. This wonderful book opens with Chief's Seattle's questioning of our "material" relationship to the Earth ("How can you buy the sky? How can you own the rain and the wind?") and an introduction by Jewell Praying Wolf James. This moving and inspiring book tells us how each new generation deserves the same opportunity our ancestors had to breathe fresh air, drink pure water, and hear the songs of nature in the wind. Recommended for grades 3-5.

In *Common Ground: The Water, Earth and Air We Share*, Molly Bang uses a simple parable about sheep and the commons they graze on to reveal a disturbing paradox about our relationship with the environment. Through it, Bang addresses how our individual actions affect the world. Recommended for grades K-3.

Handout 37.1

Susan Milord's "All Together Now"

If a regular bus can hold dozens of people, imagine what a bus twice the size can hold! In Great Britain, there are many buses like this, with extra seating on the top, that are called double-deckers.

Buses in Haiti are often very crowded. It's not uncommon for passengers to actually sit on the rooftops. Buses are affectionately called tap-taps, because the riders on the roof tap when they want to be dropped off.

Many large cities around the world take advantage of the space beneath the streets and run underground trains. Children in Paris, Mexico City, Brazil and Tokyo may use the subway system to get to school or visit friends in other neighborhoods.

Both the Japanese and French have developed high-speed trains to link various cities. While electric trains in North America average 80 mph (130 kph), the French TGV (*Train á Grand Vitesse*, French for "high-speed train") is the world's fastest, averaging over 170 mph (270 kph)!

The United States itself has plans for high speed trains that will run in the Northeast corridor and it is rumored they might be in place by the year 2000.

Hoja de trabajo 37.1

"Todos juntos", de Susan Milord

Si en un autobus (camión) regular pueden caber docenas de personas, ¡imagínese cuantas personas podrían caber en un autobus dos veces más grande! En Gran Bretaña, hay muchos autobuses como estos, con asientos en la parte de arriba a los que se les llaman autobuses de dos pisos.

Los autobuses en Haití generalmente se llenan mucho. Es muy común que los pasajeros vayan sentados en el techo del autobus. A estos autobuses se les llama cariñosamente tap-taps porque los pasajeros que van encima del techo del autobus golpean cuando ellos quieren bajar.

Muchas ciudades grandes alrededor del mundo toman ventaja del espacio usando trenes subterráneos que van debajo de las calles. Los niños en Paris, la ciudad de México, Brasil y Tokio usan el sistema de trenes subterráneos para ir a la escuela o para visitar a sus amigos de otros vecindarios.

Los japoneses y los franceces han construido trenes de alta velocidad para conectar varias ciudades. Mientras que los trenes eléctricos en Norte América tienen un promedio de velocidad de 80 mph (130kph), ¡el tren francés de alta velocidad conocido como TGV (que viene del francés *Train á Grand Vitesse*) es el tren más rápido del mundo, con una velocidad promedio de 170 mph (270 kph)!

Los Estados Unidos tiene planes de construir trenes de alta velocidad que podrían brindar su servicio en el corredor del noreste y hay rumores de que esto podría hacerse realidad en el año 2000.

Lesson 38

Counting On Cars
Contamos con los carros

Overview

By focusing on the use of automobiles, students gain a greater understanding of how the air we breathe may become polluted. They tally the number of cars that drive by in a given number of minutes, and explore how traffic contributes to air pollution.

Resumen

Al enfocarse en el uso del automóvil, los alumnos comprenden mejor cómo se puede contaminar el aire que respiramos. Llevan la cuenta del número de carros que pasan en cierta cantidad de minutos, e investigan cómo el tráfico contibuye a la contaminación del aire.

Key Skills

Counting

Graphing

Writing

Role-Playing

Working Cooperatively

Destrezas claves

Contar

Hacer gráficas

Redactar

Dramatizar

Trabajar cooperativamente

Preplanning

1. Make copies of Handout 38.1
2. Review the following terminology:

* *tally*	* *llevar la cuenta*

Suggested Time

10 minutes — Welcoming
45 minutes — Homework/Learning Options
10 minutes — Guided Discussion
35 minutes — Tallying Traffic
10 minutes — Debriefing
10 minutes — Closing

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2 hours total

Materials

A teacher can conduct this lesson alone, if necessary. If the teacher decides to conduct the "Tallying Cars" activity off school grounds, teaching assistants are recommended to provide additional supervision. The following materials are needed to conduct this lesson: Copies of Handout 38.1, "Tallying Traffic" and pencils.

Suggested Quote/Cita sugerida

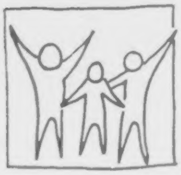
I hope you will go out and let stories happen to you, and that you will work them, water them with your blood and tears and your laughter till they bloom, till you yourself burst into bloom. Then you will see what medicine they make, and where and when to apply them.

—Clarissa Pinkola Estés, as quoted in *The Fire in Our Souls*

Ms. Pinkola Estés is a writer, Jungian analyst, and specialist in cross-cultural mythology. She is the author of several books, including *Women Who Run with the Wolves*.

Espero que salgas al mundo y permitas que te pasen historias, que trabajes con ellas, que las riegues con tus lágrimas, sangre, y carcajadas hasta que estas florescan, hasta que tú misma(o) brotes como una flor. Después verás que medicina hacen, y cuando y donde las aplicarás.

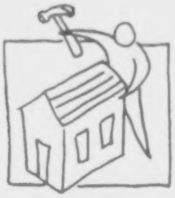
—Clarissa Pinkola Estés



Welcoming (10 minutes)

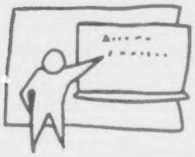
Welcome students and take attendance. Tell them that they will be working in their cooperative learning teams today. Discuss any rules you feel may need review.

Remind students that in the last lesson they discussed air and air pollution, and built traps to catch some of the visible pollution in the air. Tell them that today they will focus on air pollution that cannot be seen, and on one of the contributors of those pollutants.



Homework/Learning Options (45 minutes)

Students may use this time to complete homework, receive individual tutoring or assistance, or engage in free reading.



Curriculum

Guided Discussion (10 minutes)

Share the following information with students:

"If you remember our discussion from the last Academia, we said that there are some gases in the air that we cannot see. Sometimes, gases in the air can be smelled [refer to the example you provided of this in the last Academia], but not be seen. Some of the gases that exist in the air are necessary for our survival; for example, oxygen. Plants require nitrogen, which is also a gas found in the air. But, there are also some bad gases, ***pollutants**, that exist in the air. Two of these bad gases are called ***hydrocarbons** and ***carbon dioxide**. Does anybody know how these gases get in the air? [Allow for responses.] One way they get in the air is through the incomplete burning of gasoline. When do we burn gasoline? [Allow for responses.] When gasoline isn't burned all the way, carbon monoxide and hydrocarbons are produced and mix with the air. Most motors found in cars cannot burn gasoline all the way. Almost all of us contribute to pollution in the air by riding in cars, buses, motorcycles, vans, trucks, speed boats, or anything else with a motor that uses gasoline."

Ask students how often they ride in a motor vehicle, and ask if they can think of any way in which they could reduce the amount of pollution found in the air. It is important to remind them that cars and other motor vehicles have made our lives much easier, but that we do need to concern ourselves with the amount of pollution that such vehicles produce and that is released into the air.

Explain that most people do not realize how much they rely on cars, or on other motor vehicles, to get things done. And, most people do not realize how many motor vehicles are driven on any given day. Today, students will take a ***tally** of the number of cars and other motor vehicles that drive by their Academia site. A ***tally** is a count, or a way of registering the number of objects being counted.

Diga a los alumnos:

"Si recuerdan lo que comentamos en la última Academia, dijimos que en el aire hay gases que no podemos ver. A veces los podemos oler [recuerde el ejemplo que se dió en la última Academia], pero no se ven. Algunos de los gases que existen en el aire son necesarios para sobrevivir, como por ejemplo, el oxígeno. Las plantas necesitan nitrógeno que también es un gas que se encuentra en el aire. Pero también existen en el aire gases malos, ***contaminantes**. Dos de estos gases malos se llaman ***hidrocarbonos** y ***bióxido de carbono**. ¿Alguién sabe cómo llegan estos gases al aire? [Permita tiempo para respuestas]. Una razón es porque la gasolina no se quema completamente. ¿Cuándo quemamos gasolina? Cuando la gasolina no se quema completamente, se producen el monóxido de carbono y los hidrocarbonos y se mezclan con el aire. La mayoría de los motores de los automóviles no pueden quemar la gasolina completamente. Casi todos nosotros contribuimos a la contaminación del aire al usar carros, autobuses, motocicletas, vans, camiones, o cualquier otro vehículo de motor que use gasolina".

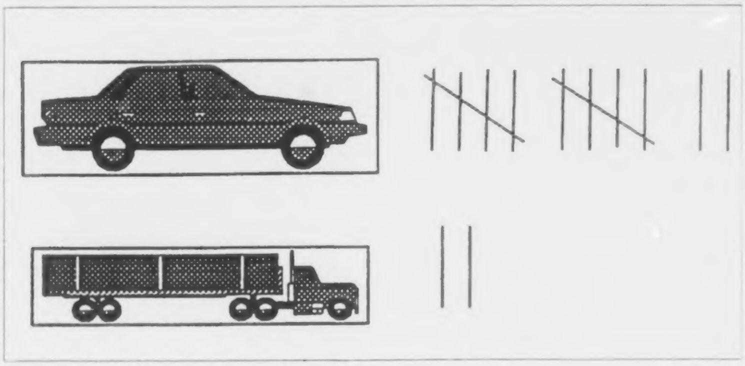
La mayoría de nosotros no nos damos cuenta de cuánto dependemos de los carros y otros vehículos de motor para todo lo que tenemos que hacer. Y la mayoría de la gente no se da cuenta de cuántos vehículos se manejan diariamente. Hoy vamos a llevar una cuenta del número de carros y demás vehículos que pasan frente a Academia.

Tallying Traffic (35 minutes)

Distribute Handout 38.1 to each student. Tell students that, as a group, they will be ***tallying** the number of cars, buses, vans, trucks, motorcycles and bicycles that drive by their Academia site. This activity can be done by going outdoors, or by allowing students to gather together by windows that look out on traffic. If you plan on taking students off Academia grounds to do this activity, remember that parental permission may be required.

Before students begin their tally, help students fill out the top portion of the "Tallying Traffic" handout. Provide students with the name of the street they will be observing, and assist them in filling out the date, the day of the week, and the time of day. You must decide how many minutes they will spend ***tallying** traffic. If students will be observing a busy street, then five to ten minutes is plenty of time. If students will be observing a street with very little traffic, provide students with approximately 15 minutes to tally traffic. Instruct students as to how they should tally the cars. Tell them that rather than using numbers, they will use symbols that will represent one and five.

Figure 1



On a large piece of butcher paper, or on a chalkboard, demonstrate this way of tallying. Use Figure 1 below as an example.

Each cooperative learning team will distribute assignments among team members. One student should focus on tallying the number of cars, another trucks, another vans, another bicycles, etc. Some students may have to double up on vehicles. Make sure each student understands what sort of vehicle(s) they will be tallying before they begin. Tell students that each group will compile their tallies to get a better picture of all the traffic they saw on that particular street, during that particular time.

After students have completed their tallies, provide each team with another handout and enough time to compile the individual tallies on one sheet.

Rationale...

Students become acquainted with a new form of counting through tallying. Make sure students use this form of counting rather than other methods they may be more comfortable with. Tallying in units of five also assists students in counting in units other than single units. Also, allow students to share other ways they might tally objects. Any other ideas? Other units?

Razón fundamental...

Los alumnos aprenden una forma nueva de contar, al llevar una cuenta. Asegúrese de que utilizen esta forma de contar y no otras que ya conozcan. El llevar una cuenta por unidades de cinco también les ayuda a contar en conjuntos y no solamente en unidades de uno.

Debriefing (10 minutes)

Ask students if they think a lot of vehicles drove by or a few. Did all of the vehicles cause air pollution? [No.] Remind students that the bicycle does not have a motor and does not burn gasoline. Ask each group to report on how many bicycles went by while they were observing. Ask students if this number was higher or lower than the other vehicles they tallied.

Share the following information:

Tallying traffic, or counting the number of motor vehicles that drive by the street, demonstrated to us that each car, each bus, each motorcycle adds to air pollution. Very often, we cannot avoid driving in a motor vehicle, but can they think of any way to cut down the amount of pollution that comes from motor vehicles? [Ride buses, carpool, make sure motor vehicles use clearner gasoline and are regularly "smog tested," walk, ride a bike.] Sometimes these solutions aren't possible or convenient, but we should try to help cut down on air pollution by remembering to use one of these solutions when possible. Burning one gallon of gasoline produces twenty pounds of the carbon dioxide that fills the air.

Dígale a los alumnos:

Al llevar una cuenta del tráfico, o contar el número de vehículos de motor que pasan por la calle, vemos que cada carro, cada autobús, cada motocicleta aumenta la contaminación del aire. Muchas veces no podemos evitar usar un vehículo de motor, pero ¿pueden pensar en una manera de reducir la contaminación que causan los vehículos de motor? A veces estas soluciones no son posibles o no son convenientes, pero debemos tratar de ayudar a reducir la contaminación del aire siempre que sea posible. Al quemar un galón de gasolina se producen veinte libras de bióxido de carbono que llena el aire.

Extension Activity

If time permits, allow each cooperative learning group to construct a graph of the amount of traffic they observed. For older students, allow them to discover, through simple mathematics, how they can estimate the amount of traffic that would go by in twice the amount of time they spent observing traffic (multiply results by two). How would they estimate the number of vehicles that go by in a two-hour period? A four-hour period? A twenty-four-hour period?

Closing (10 minutes)

Ask a few volunteers to tell the rest of the class how they would share the information they learned today with their parents. Tell students that they will return to the topic of air pollution in the next lesson, and later on in the unit they will explore some of the dangers of air pollution.

Parent Link

This lesson offers a wonderful opportunity to share information with parents about contaminants, like asbestos, that pollute the air at the workplace, and sometimes the schools our children attend. Pamphlets could be obtained from your local gas company about safeguarding homes against gas leaks, and how and where to purchase tests to determine the presence of other home contaminants like radon and lead.

Enlace familiar

Esta lección ofrece la oportunidad de compartir información con los padres acerca de los contaminantes como asbestos, que contaminan el aire del ambiente donde trabajan y algunas veces en las escuelas de nuestros niños. Se pueden obtener panfletos de la compañia local de gas que contengan información acerca la prevención de escapes de gas en las casas y dónde se pueden comprar pruebas para determinar la presencia de otros contaminantes como radón y plomo.

Literature Link

In *My Side of the Mountain*, by Jean Craighead George, a young boy who is tired of living in a city apartment runs away to the wilderness to make a life of his own. With only a pen knife, a ball of cord, his writing journal, forty dollars, and some flint and steel, he must rely on his own ingenuity and on the resources of the land to survive. (The book appears in translation under the title *Mi rincón en la montaña*, with a 1996 copywright.) Recommended for grades 5-9.

Handout 38.1

"Tallying Traffic"

Street

Day of the week

Time of day

I watched for minutes.

The number of vehicles I counted:

CARS:

TRUCKS:

MOTORCYCLES:

BUSES:

BICYCLES:

Handout 38.1

"Llevando la cuenta del tráfico"

Calle

Día de la semana

Hora del día

Observé por minutos.

El número de vehículos que conté:

COCHES:

CAMIONES:

MOTOCICLETAS:

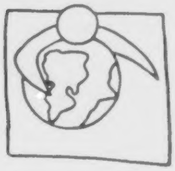
AUTOBUSES:

BICICLETAS:

437

Lesson 39

Trapping Pollution
Atrapamos la contaminación



Overview

In this lesson, students return to their "pollution traps" and continue to explore the concept of air pollution. They compare their predictions to their actual findings.

Resumen

En esta lección los alumnos vuelven a sus "trampas de contaminación" para seguir estudiando la contaminación del aire. Comparan sus predicciones con los resultados reales.

Key Skills

Making observations

Experimenting

Comparing predictions to actual findings

Drawing conclusions

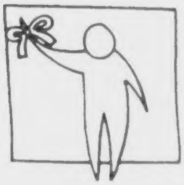
Destrezas claves

Hacer observaciones

Experimentar

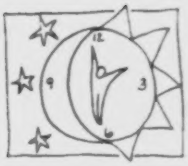
Comparar predicciones con resultados reales

Sacar conclusiones



Preplanning

Review the Session Plan for this lesson.



Suggested Time

10 minutes — Welcoming
45 minutes — Homework/Learning Options
15 minutes — Guided Discussion
25 minutes — Pollution Trap Experiment
15 minutes — Journal
10 minutes — Closing

2 hours total

Materials

A teacher can conduct this lesson alone, if necessary. The following materials will be needed:

- One magnifying glass for every two students.
- One sheet of clean white paper for every two students.

Suggested Quote/Cita sugerida

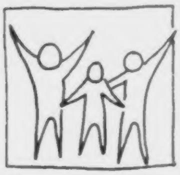
I hope you will go out and let stories happen to you, and that you will work them, water them with your blood and tears and your laughter till they bloom, till you yourself burst into bloom. Then you will see what medicine they make, and where and when to apply them.

—Clarissa Pinkola Estés as quoted in *The Fire in Our Souls*

Ms. Pinkola Estés is a writer, Jungian analyst, and specialist in cross-cultural mythology. She is the author of several books, including *Women Who Run with the Wolves*.

Espero que salgas al mundo y permitas que te pasen historias, que trabajes con ellas, que las riegues con tus lágrimas, sangre, y carcajadas hasta que estas florescan, hasta que tú misma(o) brotes como una flor. Después verás que medicina hacen, y cuando y donde las aplicarás.

—Clarissa Pinkola Estés

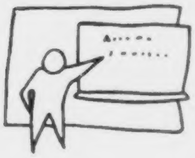


Welcoming (10 minutes)

Welcome students and take attendance. Select a student volunteer from each cooperative learning team to chart their team's recycling efforts. Choose another student to chart the recycling contributions of the class.

Homework/Learning Options (45 minutes)

Students should use this time to complete homework assignments, do free reading, or to receive individualized tutoring.



Curriculum

Guided Discussion (20 minutes)

Work with students in a whole group to further discuss the issue of air pollution and address ideas about what they may find in their pollution traps.

Ask students to pair up with the partner they had in Lesson 37, and to take three minutes to brainstorm and share the many ways in which air pollution is created.

Tell them:

"We have already discussed pollution from cars. What are some other sources of air pollution?" Now that they have taken some time to brainstorm some ideas, take a few minutes to have them share their ideas on the board. Each pair of students should select one or two ideas and jot them themselves on the board. Some examples may include factories, toxic chemicals and gases, and barbecues.

Díga a los alumnos:

Haciendo equipo con su compañero/a de la Lección 37, pídale a los estudiantes que tomen tres minutos para hacer una "lluvia de ideas" sobre las maneras en que se produce la contaminación del aire. Ya han hablado de la contaminación de los automóviles. ¿Qué otras cosas causan la contaminación del aire? Ahora que han descubierto algunas ideas, pídale que las compartan en el pizarrón. Cada pareja escogerá una o dos ideas para escribirlas en el pizarrón. Algunos ejemplos deberán ser: fábricas, substancias químicas y gases tóxicos, y asadores de carne.

The Pollution Trap Experiment (20 minutes)

Students will continue to work with the partner they had in Lesson 37. Before students begin the activity, the instructor should review the procedures and demonstrate how to handle the trap, and how to use the magnifying glass. Explain to students that, while one student is looking through the magnifying glass, the other should document findings in their journals. On each pollution trap, write down where it was hanging. Ask students to look at the predictions they made. How did their predictions compare with their findings?

Provide students with the following instructions (you might want to jot these down on the board for easy reference):

A. Collect the traps, being careful not to touch the sticky side of the tape in the holes.

B. Hold the traps up to a window so light shines through the tape covering the holes. Study the sticky side of this tape with your magnifying glass. Can you see any dirt? Have your partner document your findings. Now, allow your partner the opportunity to view his/her trap though the magnifying glass and document his/her findings.

C. Lay one of the traps on a sheet of clear white paper. Lay a new trap (one that hasn't been used) on the paper beside it. Is the tape on the used trap darker colored than the tape in the new trap? Each partner should record his/her findings.

D. Exchange your findings with your partner. Based on your findings, decide where the most polluted air was found. Where do you think this dirt came from?

Briefly discuss with students their findings, and tell them that they will discuss a particular type of air pollution called acid rain in the next lesson.

Ofrezca a los alumnos las siguientes instrucciones:

A. Recojan las trampas, teniendo cuidado de no tocar el lado pegajoso de la cinta en los agujeros.

B. Detengan las trampas frente a la ventana para que la luz pase por la cinta que está tapando los agujeros. Observen el lado pegajoso de la cinta con su lupa. ¿Pueden ver algo de suciedad? La otra persona apunta las observaciones. Ahora permitan que el segundo compañero observe la trampa con la lupa y que el primero lo apunte.

C. Pongan una trampa sobre una hoja limpia de papel blanco. Pongan junto a ella, sobre el papel, una trampa nueva (que no se haya usado). La cinta de la trampa usada ¿está más obscura que la cinta de la trampa nueva? Cada compañero debe anotar sus observaciones.

D. Intercambien sus anotaciones con su compañero. Basándose en sus observaciones, decidan dónde se encontró el aire más contaminado. ¿De dónde creen que la suciedad ha venido?

Journal (15 minutes)

Ask students to write a paragraph or two in their journals comparing their predictions to their actual findings. Students should also address the following question: "Where did the pollution found in the trap come from?"

Closing (10 minutes)

Ask students to try to think of a way to keep their traps clean and free of pollutants. If time permits, have a few volunteers read from their journals.

Parent Link

Have students discuss with their parents what they learned about their predictions and findings at Academia today and how in the next lesson they will be learning all about "acid rain," rain that has been polluted. (In preparation for this, 1½ to 2 weeks ahead of this lesson, depending upon typical weather conditions for the time of year and the geographical location of your Academia site, you might want to have students conduct the rain experiment included here as Handout 39.1. They can do this at home with their parents, and jot down their findings in their nature walk journals.)

Enlace familiar

Diga a los alumnos que conversen con sus padres de lo que aprendieron hoy acerca de las predicciones y resultados en Academia. En la próxima lección aprenderán todo acerca de la "lluvia ácida", lluvia que ha sido contaminada. (Como preparación a esto, una semana y media o 2 semanas antes de hacer esta lección, pídale a los alumnos que hagan el experimento de la lluvia incluida en la Hoja de trabajo 39.1). Pueden hacer esto en casa con sus padres y anotar sus resultados en su diario de caminatas en la naturaleza.

Handout 39.1

Jean Potter's "Water Quality Experiment: Is Rain Water Pure Water?"

You will need the following materials to conduct this family experiment:

- ☆ One coffee filter.
- ☆ One plastic cup.
- ☆ One wide rubber band.
- ☆ Rain water.

Now that you have all you need, follow these steps:

1. Place the coffee filter over the mouth of the plastic cup.
2. Put the rubber band around the filter to keep the filter in place.
3. Press a small dent in the middle of the filter so the water will drain well.
4. Place the cup in the rain to collect rain water.
5. After the rain, remove and examine the filter. What do you see?
6. Jot down your findings.

When you inspected the filter, you probably saw some dark specks and perhaps some smudges on it. The water passed through the filter, but other particles did not. Water in the air picks up dirt and dust particles. When the water falls back to earth, it takes these particles with it. Sometimes the particles are harmful, as in the case of "acid rain," rain that is polluted. Acid rain is caused by the release of gases and other matter into the atmosphere from factories and engines and from natural occurrences like volcanoes and other sources. The chemicals in these materials mix with rain water and change its composition.

Hoja de trabajo 39.1

Experimento de calidad de agua de Jean Potter: "¿Es el agua de la lluvia pura?"

Los siguientes materiales son necesarios para hacer este experimento familiar:

- ☆ Un filtro para hacer café.
- ☆ Agua de lluvia.
- ☆ Un vaso de plástico.
- ☆ Un elástico ancho.

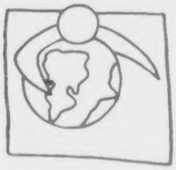
Después de que tenga listo los materiales, siga los siguientes pasos:

1. Ponga el filtro para hacer café sobre el vaso de plástico.
2. Ponga el elástico alrededor del vaso para sostener el filtro de café.
3. Haga una pequeña abolladura en el medio del filtro para que el agua pueda filtrar con facilidad.
4. Ponga el vaso en la lluvia para colectar el agua.
5. Después de que pase la lluvia, saque el filtro y examínelo. ¿Qué ve en el filtro?
6. Anote sus observaciones.

Cuando haga la inspección del filtro, probablemente encontrará partículas obscuras y quizás manchas. El agua pasa por el filtro pero las partículas se quedan. El agua en el aire se contamina con partículas de tierra y polvo. Cuando el agua cae a la tierra se lleva consigo estas partículas. Algunas veces estas partículas son dañinas como en el caso de la "lluvia ácida" que es lluvia que está contaminada. La lluvia ácida es causada por el escape de gases y otros contaminantes a la atmósfera, por las fábricas, motores, y otros fenómenos y ocurrencias naturales como la explosión de volcanes. Las substancias químicas en estos materiales se mezclan con la lluvia y cambian su composición.

Lesson 40

The Queen of Chalk
La reina de la tiza



Overview

This lesson continues the discussion on air pollutants and introduces the problem of acid rain. Students learn how acid rain develops, have an opportunity to witness the damage it can create, and discuss possible solutions to this problem. The "Queen of Chalk" activity used in this lesson was developed by the National Science Foundation for National Science and Technology Week.

Resumen

Esta lección sigue explorando el tema de la contaminación del aire y presenta el problema de la lluvia ácida. Los alumnos aprenden cómo se produce la lluvia ácida y observan el daño que puede causar. También discuten posibles soluciones al problema. La actividad "La reina de la tiza" fué desarrollada por el National Science Foundation para la Semana Nacional de Ciencia y Tecnología.

Key Skills

Estimating

Identifying

Observing

Experimenting

Documenting results

Drawing conclusions

Destrezas claves

Hacer estimados

Identificar

Observar

Experimentar

Anotar resultados

Sacar conclusiones

Preplanning

1. Read "Background for the Teacher."
2. Review the following terminology:

* *acid rain*	* *lluvia ácida*
* *sulfuric acid*	* *ácido sulfúrico*
* *sulphur dioxide*	* *bióxido sulfúrico*

Background for the Teacher

Acid rain is a problem all around the world. It is eroding monuments in Washington, DC, ancient Native American cities in Colorado, statues and monuments in Rome, and maybe even tombstones in your local cemetery.

Sulphur dioxide is a toxic gas for plants and animals. Most of the sulphur dioxide we find in the air is produced in generator plants that burn carbon for electricity. In natural systems, microorganisms found in the earth use a small amount of sulphur dioxide. But, sulphur dioxide in large amounts can cause serious pollution problems, because when sulphur dioxide combines with oxygen and vapor in the air, it converts to sulfuric acid. The acid formed in the atmosphere falls to the ground with the rain, and this combination is called ***acid rain**.

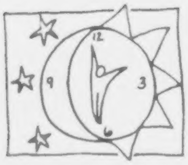
Limestone and marble are rocks used worldwide in the construction of buildings, bridges, statues, and even gravestones. These rocks react with sulfuric acid by dissolving! Not quickly of course, because the acid is very weak. Delicate features dissolve first and, in time, the whole structure can change form, or be weakened.

Información para el/la maestro/a:

La lluvia ácida es un problema en todo el mundo. Está causando erosión en los monumentos de Washington, DC, las antiguas ciudades indígenas de Colorado, las estatuas y los monumentos de Roma, y quizás hasta en las lápidas del cementerio local. El bióxido sulfúrico es un gas que le es tóxico a las plantas y los animales. Casi todo el bióxido sulfúrico que encontramos en el aire se produce en las plantas generadoras que queman carbón para producir electricidad. En un sistema natural, los microorganismos que se encuentran en la tierra utilizan una pequeña cantidad de bióxido sulfúrico. Pero en grandes cantidades, el bióxido sulfúrico puede causar serios problemas de contaminación, porque cuando se combina con el oxígeno y el vapor del aire, se convierte en ácido sulfúrico. El ácido formado en la atmósfera cae a la tierra con la lluvia, y esta combinación se llama ***lluvia ácida**.

La piedra caliza y el mármol se utilizan mundialmente en la construcción de edificios, puentes, estatuas, y hasta lápidas. Al reaccionar con el ácido sulfúrico

¡estas piedras se disuelven! Claro que no rápidamente, porque el ácido no es muy fuerte. Primero se disuelven las partes más delicadas y con el tiempo, la estructura entera puede cambiar de forma o quedar debilitada.



Suggested Time

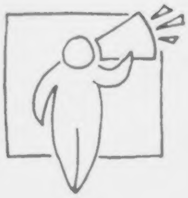
10 minutes — Welcoming
45 minutes — Homework/Learning Options
15 minutes — Guided Discussion
25 minutes — The Queen of Chalk
15 minutes — Debriefing
10 minutes — Closing

2 hours total

Materials

A teacher and teaching assistant are needed to fully implement this lesson, as well as the following materials:

- Photos of statues and monuments such as: Washington, DC monuments; Mount Rushmore; statues and monuments of the city of Rome, Italy; tombstones in a cemetery; ancient Native American settlements in the U.S.; and, the pyramids of Egypt, Mexico, and Central America.
- A piece of chalk, a nail, and a drinking straw for each child.
- Vinegar and a small saucer for each student.



Suggested Quote/Cita sugerida

I hope you will go out and let stories happen to you, and that you will work them, water them with your blood and tears and your laughter till they bloom, till you yourself burst into bloom. Then you will see what medicine they make, and where and when to apply them.

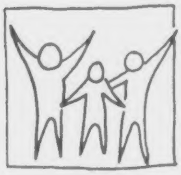
—Clarissa Pinkola Estés as quoted in *The Fire in Our Souls*

Ms. Pinkola Estés is a writer, Jungian analyst, and specialist in cross-cultural mythology. She is the author of several books, including *Women Who Run with the Wolves*.

Espero que salgas al mundo y permitas que te pasen historias, que trabajes con ellas, que las riegues con tus lágrimas, sangre, y carcajadas hasta que estas florescan, hasta que tú misma(o) brotes como una flor. Después verás que medicina hacen, y cuando y donde las aplicarás.

—Clarissa Pinkola Estés

SESSION PLAN

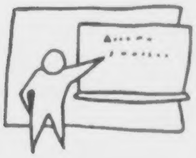


Welcoming (10 minutes)

Welcome students and review the previous discussion about air pollution. Tell students that today they will learn about a particular type of pollution called ******acid rain*. Ask students if they have ever heard of acid rain, and if there is anyone in the class who would like to share what they think it is with other students.

Homework/Learning Options (45 minutes)

Students may use this time to complete homework, receive individualized tutoring or assistance, or engage in free reading.



Curriculum

Guided Discussion (15 minutes)

Show students the pictures of the different monuments, statues, buildings, tombstones, etc., that have been slowly damaged, dissolved, ruined, and/or have been weakened by ***acid rain***.

Explain the concept of **acid rain*:

"***Acid rain*** is a problem all around the world. ***Acid rain*** is a form of pollution. When we drive cars (gasoline contains carbon), or when generator plants burn carbon (which is found in the earth), something called ***sulphur dioxide*** is released into the air. ***Sulphur dioxide*** is necessary for a few organisms to live, but when too much ***sulphur dioxide*** is in the air it can cause a large problem. The United States puts nearly 20 million tons of ***sulphur dioxide*** into the air each year. This is a lot of ***sulphur dioxide***. When this chemical combines with rain, it becomes ***sulfuric acid***, which falls to the ground as ***acid rain***."

Explique el concepto de la **lluvia ácida*:

"La ***lluvia ácida*** es un problema en todo el mundo. La ***lluvia ácida*** es una forma de contaminación. Cuando manejamos carros (la gasolina contiene carbón), o cuando las plantas generadoras queman carbón, que se encuentra en la tierra, despide al aireuna sustancia química llamada ***bióxido sulfúrico***. El ***bióxido sulfúrico*** es necesario para la vida de algunos organismos, pero en el aire puede causar un grave problema. En los Estados Unidos, cada año entran al aire casi 20 mil millones de toneladas de ***bióxido sulfúrico***. ¡Esto es muchísimo!

Cuando esta substancia química se combina con la lluvia, se convierte en ***ácido sulfúrico**, que cae a la tierra como ***lluvia ácida**."

Tell students that in today's lesson, they will have an opportunity to explore some of the pollutants and particles that contaminate our air. Students will experiment with how these particles mix with other chemicals and rain, and cause damage to buildings, statues, and monuments.

The Queen of Chalk (25 minutes)

Tell students the following:

"***Acid rain** is a problem that affects statues and monuments, as well as living forms around the world. High above the earth, water begins to gather around tiny particles in the air to form raindrops. Other chemicals such as sulfuric acid also gather in raindrops. When we have a rainstorm, this contaminated rainwater is called ***acid rain**. When this acid rain falls, it erodes, and acts on buildings, bridges, statues and even tombstones made of limestone and marble, by dissolving and weakening them."

Digale a los alumnos:

"***La *lluvia ácida** es un problema que afecta a estatuas y monumentos, así como a los seres vivientes alrededor del mundo. En lo alto del cielo, el agua se junta alrededor de pequeñísimas partículas para formar gotas de lluvia. Otras substancias químicas como el ácido sulfúrico también se juntan en las gotas, y cuando llueve caen como ***lluvia ácida**. Cuando esta ***lluvia ácida** cae actúa sobre los edificios, puentes, estatuas y hasta lápidas hechas de piedra caliza y mármol, y las disuelve".

Ask them:

"How would you feel if the features on these monuments disappeared or the monuments themselves were ruined or disappeared completely? Are they worth saving to you?"

Pregunte a los alumnos:

"¿Como se sentirían si los rasgos delicados de estos monumentos desaparecieran, o si los edificios mismos desaparecieran completamente? ¿Creen que valga la pena salvarlos?"

Students can work in cooperative learning groups to do this experiment. Each team will need a Materials Monitor, one or two Statue Covers, a Rain Maker, and an Observer/Notetaker. The instructor should explain the various steps involved in the experiment and demonstrate them for students. Have a materials monitor from each team come up and get needed materials, so their team can conduct their own "acid rain" experiment.

Tell them:

1. You will begin by carving out a simple chalk statue with a nail. Be certain to make some details in the statue, such as eyes or design lines. The carving can be as simple or detailed as your team wishes.
2. Be certain the bottom of your chalk statue is flat. If it isn't, carve the bottom so that the statue will stand upright. Set the statue upright in the center of the saucer.
3. Stick the straw down into the vinegar. Put your finger on the top end of the straw and press down against it. While pressing, lift the straw (vinegar will be trapped inside as long as you keep the top end sealed with your finger). Hold the bottom end of the straw over the statue.
4. Pretend the straw is a cloud and the vinegar is rain. Lift your finger and let the "rain" splash down over your statue. Return the straw to the vinegar and get more "rain." Repeat this over and over. Watch the chalk each time you make it "rain."
5. The features made on the statue will dissolve first. Then the entire shape will change. If you continue long enough, or simply lay the statue in the vinegar for a short time, the entire statue will dissolve!

Discuss with students the reactions involved in this experiment. The chalk is a chemical called calcium carbonate, which is closely related to limestone. The vinegar is acetic acid. When they join together, they become a new chemical called calcium acetate. This chemical reaction continues as you keep dropping fresh vinegar on the chalk. The acetic acid is like acid rain (or sulfuric acid) and dissolves the chalk the same way acid rain dissolves marble or limestone.

Tell students that acid rain, like other forms of air pollution, also has an effect on plants and animals. There is evidence that acid rain affects forests, rivers, lakes and agricultural areas by changing the acidity levels of the soil and water.

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1. Pida a los alumnos que tallen una estatua sencilla de tiza con un clavo. La estatua debe tener detalles como ojos o líneas. La estatua puede ser bien sencilla o detallada, como quiera cada equipo.
2. Asegúrense de que la base de su estatua esté plana. Si no lo está, tállenla para que la estatua quede derecha. Paren la estatua en medio del plato.
3. Metan el popote/sorbeto dentro del vinagre. Pongan un dedo sobre la punta de arriba del popote/sorbeto y presionen hacia abajo. Al oprimir, levanten el popote/sorbeto (el vinagre quedará atrapado dentro del

popote/sorbeto mientras la punta siga tapada). Pongan la otra punta sobre la estatua.

4. Hagan de cuenta que el popote/sorbeto es una nube y el vinagre es la lluvia. Levanten el dedo y dejen caer la "lluvia" sobre la estatua. Vuelvan a sacar vinagre con el popote/sorbeto para hacer más "lluvia". Repitan esto varias veces, observando la tiza cada vez que caiga la "lluvia".
5. Los detalles de la estatua serán los primeros en disolverse. Luego cambiará la forma entera. Si este proceso sigue por mucho tiempo, o si se deja la estatua en el vinagre por algún tiempo, ¡la estatua entera se disolverá!

Inside-Outside Circle (15 minutes)

Allow students to share their discovery by using an "Inside-Outside Circle" to debrief after the "Queen of Chalk" activity.

This cooperative learning structure, detailed in Spencer Kagan's book *Cooperative Learning*, requires the formation of two concentric circles. Half of the students should stand in the inside circle facing out, and the other half should stand in the outside circle facing in. When the teacher gives the signal, students will rotate in the indicated direction, past the indicated number of people. Facing their new partner, each child will share information as prompted by the instructor.

Briefly discuss the procedures involved in the "Inside-Outside Circle." When students understand the procedure, and have practiced rotating to the left and right, proceed with the following instructions:

Rotate *two* people to the *right* - Discuss with your partner what the vinegar did to your chalk monument.

Rotate *two* people to the *right* - Discuss whether this is the same type of reaction that acid rain created by cars has on marble or limestone?

Rotate *three* people to the *left* - Discuss if there are ways to clean the air. Should we care about the air pollution that cars create?

Pregunte a los alumnos:

"¿Qué le hizo el vinagre a la estatua de tiza?

¿Es ésta la misma reacción que tiene la lluvia ácida sobre el marmól y la piedra caliza?

¿De qué manera se puede limpiar el aire? ¿Nos debe importar la contaminación del aire que crean los carros?"

If time permits, ask students to write a paragraph answering the last three questions, and draw a picture to go with their paragraph. This could also be assigned as an independent activity that is due at the next class meeting.

Closing (10 minutes)

Briefly review the day's activity. Ask a few students to discuss how they would share the information they learned today with their parents or with a brother or a sister. Tell the class that they will continue to explore the effects of air pollution in the next lesson.

Parent Link

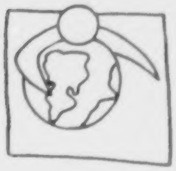
Rain is often associated with sadness and mourning, though often it is a time when activities are confined to the indoors and family members are brought close together. Have parents and children enter into a discussion about the blessings of the rain, and any mythological figures or legends that may have to do with it. With the help of their parents, students can brainstorm a list of fun activities the family can do together during a rainy day (or other inclement weather).

Enlace familiar

A la lluvia generalmente se le relaciona con la tristeza y el luto, aunque a menudo cuando hay mal tiempo es cuando la familia se limita a hacer actividades dentro la casa y es cuando más la familia se une. Pida a los padres y alumnos que discutan las bendiciones que proporciona el agua y cualquier otra figura mitológica o leyenda que tenga algo que ver con eso. Con la ayuda de sus padres los estudiantes pensarán en ideas para hacer una lista de actividades divertidas que la familia puede hacer durante un día llivioso (o cuando haya otro tipo de mal tiempo, etc.).

Lesson 41

Global Warming: Inside the Greenhouse (Part I)
El calentamiento global: Dentro del invernadero (Parte I)



Overview

The greenhouse effect has become extremely important because of its association with global warming. In this lesson, students explore what "global warming" is all about, including the resulting "greenhouse effect." They learn how this effect works and predict what the consequences will be if it worsens. The activity in this lesson was developed by the National Science Foundation for National Science and Technology Week.

Resumen

El "efecto de invernadero" se ha vuelto muy importante porque se asocia con el calentamiento global. En esta lección, los alumnos estudian de qué se trata el calentamiento global, incluyendo el resultado del "efecto de invernadero". Aprenden cómo funciona este efecto y hacen predicciones sobre las posibles consecuencias si llega a empeorar.

Key Skills

Experimenting

Deductive reasoning

Recording

Analyzing

Writing

Destrezas claves

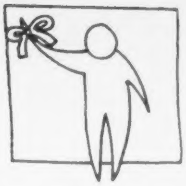
Experimentar

Razonamiento deductivo

Registrar datos

Analizar

Redactar



Preplanning

1. Review "Background for the Teacher."
2. Review the following terminology:

* *greenhouse effect*	* *efecto de invernadero*
* *global warming*	* *calentamiento global*

Background for the Teacher

The Earth's climate is warming in response to the atmospheric accumulation of heat-trapping gases, such as carbon dioxide. Carbon dioxide and other greenhouse gases are relatively transparent to sunshine, but they trap heat by absorbing the infrared radiation released by the Earth. Like the glass of a greenhouse, these gases allow sunlight to stream in freely, but block radiated energy from the Earth from escaping to space.

Trapping heat near the surface of the planet by naturally emitted trace gases is a vital process. Without it, the planet would be too cold for habitation. But rapid increase in human-induced greenhouse gases in the atmosphere is cause for concern. Since the Industrial Revolution, humans have increased the atmospheric content of carbon dioxide by 25 percent by burning fossil fuels and clearing forests. Plants and trees produce their own food by using ***carbon dioxide**,* water, and energy from the sun. When forests are cleared, plants and trees that would have converted carbon dioxide into oxygen and glucose disappear. Instead, more and more carbon dioxide remains in the air. Many scientists believe that increasing the concentration of carbon dioxide in the atmosphere will increase the greenhouse effect.

Some climatologists predict that, if current trends persist, the Earth will warm by two to five degrees Celsius by 2050. Such a change could cause ecological, economic, and social upheaval. In the United States, a higher temperature would parch the corn and wheat belts, and rainfall would decline 40 percent. The evaporation of Lake Michigan would leave acres of mud around Chicago. Rivers that provide water to southern California would sharply diminish. Ice caps would melt and sea levels would rise, endangering coastal ecosystems. Changes in human settlement patterns, food production, and water resources would follow environmental changes.

The rate at which the effects of global warming will be seen is uncertain. In the face of this uncertainty, there are several responses to the threat of global warming. First, some people have proposed technical measures to counteract climatic change; for example, spreading dust in the upper atmosphere to reflect sunlight. Some people favor passive adaptation by reacting to events as they unfold, as opposed to spending large sums of money to avert possible

outcomes that may never materialize. The third response is prevention by slowing the buildup of greenhouse gas. Energy conservation measures, alternative energy sources, or a switch to fuels with lower carbon content could reduce carbon dioxide emissions. Halting deforestation and increasing the forest biomass could moderate the buildup of atmospheric carbon dioxide by locking up more carbon in growing trees.

Información para el/la maestro/a:

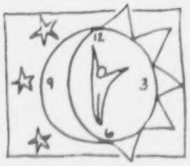
El clima de la Tierra se está calentando como resultado de la acumulación atmósferica de gases, como el anhídrido carbónico, que atrapa el calor. El anhídrido carbónico y otros gases de tipo "invernadero" son relativamente transparentes a la luz del sol, pero atrapan el calor al absorber la radiación infrarroja que despide la Tierra. Como el vidrio de un invernadero, estos gases permiten que la luz del sol entre libremente, pero no permiten que la energía soltada por la Tierra escape al espacio.

El que los gases emitidos naturalmente atrapen el calor cerca de la superficie del planeta es un proceso vital, sin el cual el planeta sería demasiado frío para habitarlo. Pero el aumento tan rápido de gases en la atmósfera causado por los seres humanos es motivo de preocupación. Desde la Revolución Industrial, al quemar combustibles fósiles y talar bosques los seres humanos han aumentado en un 25 por ciento el contenido de anhídrido carbónico en la atmósféra. Las plantas y los árboles producen su propio alimento utilizando anhídrido carbónico, agua, y energía del sol. Cuando se talan los bosques, desaparecen las plantas y los árboles que hubieran convertido el carbón en oxígeno y glucosa. En su lugar, permanece en el aire más y más anhídrido carbónico. Muchos científicos piensan que al aumentar la concentración del anhídrido carbónico en el aire aumentará también el "efecto de invernadero".

Algunos climatólogos predicen que, si continúa la tendencia actual, para el año 2050 la temperatura de la Tierra tendrá un aumento de entre dos y cinco grados Celsius. Tal cambio podría causar trastornos ecológicos, económicos, y sociales. En los Estados Unidos, una temperatura más alta resecaría las zonas de maíz y trigo, y la precipitación disminuiría por un 40 por ciento. La evaporación del Lago Michigan dejaría enormes depósitos de lodo alrededor de Chicago. Los ríos que le proveen agua al sur de California decrecerían muchísimo. Las capas de hielo se derritirían y los niveles del mar aumentarían, poniendo en peligro a los ecosistemas de las costas. Estos cambios ambientales ocasionarían cambios en los asentamientos humanos, la producción de alimentos y los recursos de agua.

La rápidez con que se verán los efectos del calentamiento global está en duda. Gracias a esta inseguridad, hay varias respuestas al peligro de este calentamiento. Primero, algunas personas han propuesto medidas técnicas para

contrarrestar el cambio de clima, como por ejemplo, extender polvo en la atmósfera para reflejar la luz del sol. Algunas personas están a favor de la adaptación pasiva, es decir, reaccionar a los eventos según ocurren, en vez de gastar grandes cantidades de dinero para prevenir posibles resultados que quizás nunca sucedan. La tercer respuesta es la prevención, limitando la acumulación de gases tipo invernadero. Las medidas de conservación de energía, las fuentes alternativas de energía, o la conversión a combustibles con menos carbón podrían reducir las emisiones del anhídrido carbónico. Al parar la desforestación y aumentar la masa de bosques, se podría modificar la acumulación de anhídrido carbónico en la atmósfera, encerrando más carbón en los árboles que crecen.



Suggested Time

10 minutes — Welcoming
45 minutes — Homework/Learning Options
20 minutes — Inside the Greenhouse
20 minutes — Guided Discussion
5 minutes — Debriefing
10 minutes — Journal Writing
10 minutes — Closing

2 hours total

Materials

A teacher and teaching assistant are needed to fully implement this lesson. The following materials will be needed:

- Two small thermometers per cooperative learning team.
- A glass jar per cooperative learning team.
- Watch or clock with a second hand.
- Handout 41.1.

Suggested Quote/Cita sugerida

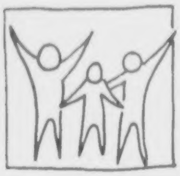
I hope you will go out and let stories happen to you, and that you will work them, water them with your blood and tears and your laughter till they bloom, till you yourself burst into bloom. Then you will see what medicine they make, and where and when to apply them.

—Clarissa Pinkola Estés as quoted in *The Fire in Our Souls*

Ms. Pinkola Estés is a writer, Jungian analyst, and specialist in cross-cultural mythology. She is the author of several books, including *Women Who Run with the Wolves.*

Espero que salgas al mundo y permitas que te pasen historias, que trabajes con ellas, que las riegues con tus lágrimas, sangre, y carcajadas hasta que estas florescan, hasta que tú misma(o) brotes como una flor. Después verás que medicina hacen, y cuando y donde las aplicarás.

—Clarissa Pinkola Estés



Welcoming (10 minutes)

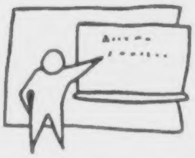
Remind students that several months ago, in Unit 3, they talked a little about the **greenhouse effect*. Ask students how many of them remember that. Ask what they can tell you about what they learned back then.

Recuerdele a los alumnos:

"Hace unos cuantos meses, en la Unidad 3 hablamos del ****efecto del invernadero***. ¿Quiénes se acuerdan de eso? ¿Qué pueden contarme de lo que aprendieron entonces?"

Homework/Learning Options (45 minutes)

Students may use this time to complete homework, receive individualized tutoring or assistance, or engage in free reading.



Curriculum

Inside the Greenhouse (20 minutes)

Reintroduce the topics of the greenhouse effect and global warming, and explain the following:

****Global warming*** might be the most threatening of the environmental problems that are directly linked to human activities. In this activity, students will learn how the greenhouse effect works and causes ****global warming***. For this activity, they will work in their cooperative learning groups.

Prior to the investigation, review the procedures for working in cooperative groups and assign the following roles:

☆ Supplies Monitor

☆ Recorder

☆ Reporter

☆ Temperature checker

Explíque a los alumnos:

El ****calentamiento global*** quizás sea el problema ambiental más grave causado por la actividad humana. En esta actividad aprenderán cómo el ****efecto de invernadero*** causa el ****calentamiento global***.

Suggestion...

Before beginning this activity make sure students know how to read a thermometer. Take a few minutes to review how this is done.

Then, provide students with the following instructions:

1. "Select someone in your group to collect the materials for your group. Your group will need two thermometers and one glass jar.
2. To begin the experiment place the two thermometers on a sunny windowsill. When I tell you that five minutes have passed, record the temperature of both thermometers on Handout 41.1.
3. Place the glass jar over one of the thermometers and record the temperature on both thermometers each time I give the signal. [Every minute, for ten minutes]. Fill in the space on the handout after every reading.
4. After the last reading of the thermometer, remove the glass jar and thermometers from the windowsill and return the materials. Then, we will discuss our findings."

Explíquele a los alumnos:

1. "Escogan a una persona de su equipo para recoger sus materiales. Cada grupo necesita dos termómetros y un frasco de vidrio.
2. Para empezar la investigación, pongan los dos termómetros en la repisa de una ventana soleada. Cuando yo les avise que ya pasaron cinco minutos, anoten la temperatura del termómetro en la Hoja de trabajo 55.1.
3. Pongan el frasco sobre uno de los termómetros , y anoten la temperatura de los dos termómetros cada vez que yo les dé la señal [cada minuto, durante diez minutos]. Después de tomar la temperatura, anótenla en la hoja de trabajo.
4. Después de la última anotación, quiten el frasco y los termómetros de la ventana y devuelvan los materiales. Ahora vamos a platicar de lo que descubrimos".

Guided Discussion (20 minutes)

Discuss with students the results of their investigations. Then, ask them the following:

"What did you notice about the data you collected during the investigation? What happened to the temperatures of the two thermometers?" In this investigation, the glass jar allowed sunlight in to warm the air, but blocked the mixing of the inside air with the outside air. As a result, the air in the jar grew warmer.

Pregúnte a los alumnos:

"¿Qué notaron sobre los datos que reunieron durante la investigación? ¿Qué pasó con las temperaturas de los dos termómetros?" En esta investigación, el frasco de vidrio dejó pasar la luz del sol para calentar el aire, pero no dejó que el aire de adentro se mezclara con el aire de afuera. Como resultado el aire de adentro del frasco se calentó.

Explain that the glass jar serves as a model to help us understand ***global warming***. Scientists use models to describe the real world. Gases in the atmosphere act like the glass jar. The heat stays near the Earth's surface instead of escaping to space. Just as the air in the glass jar got warmer, the air near the surface of the Earth warms. Scientists call the increase in temperature ***global warming***.

Ask students:

"Do you remember the name of one of the gases we find in the atmosphere? Right! It's ***carbon dioxide***. The Earth is heated by solar energy and the atmosphere works like the windows of a greenhouse and retains the heat. Carbon dioxide increases this effect of trapping the heat. Carbon dioxide is almost transparent to sunshine, but traps heat by absorbing the infrared radiation released by the Earth. In the next lesson we will examine evidence of ***global warming***."

Explíque a los alumnos:

"El frasco de vidrio sirve de modelo para explicar cómo aumenta la temperatura de la Tierra. Los científicos usan modelos para describir el mundo real. Los gases en la atmósfera hacen lo mismo que el frasco de vidrio. ¿Se acuerdan del nombre de uno de los gases que se encuentra en la atmósfera? Sí, es el anhídrido carbónico. El anhídrido carbónico es casi transparente a la luz del sol, pero atrapa el calor al absorber la radiación infrarroja que suelta la Tierra. El calor se queda sobre la superficie de la Tierra, en vez de escapar al espacio. Así como el aire dentro del frasco de vidrio se calentó, el aire que está cerca de la superficie de la tierra se calienta. Los científicos le llaman "calentamiento global" al aumento de temperatura de la Tierra".

Debriefing (5 minutes)

Discuss briefly with students where carbon dioxide comes from. Carbon dioxide comes mostly from human activity. Whenever combustion (burning of fuel) takes place in big machines such as cars, motorcycles, electric saws, etc., carbon combines with oxygen to form carbon dioxide.

Pregúnte a los alumnos:

"¿De dónde viene el anhídrido carbónico? Casi todo viene de la actividad humana. Siempre que se quema petróleo, gasolina, carbón, o gas natural, en las máquinas grandes como carros, motocicletas, sierras eléctricas, etc., el carbón se combina con oxígeno para formar el anhídrido carbónico".

Journal Writing (10 minutes)

Ask students to write in their journals about the ways they contribute to carbon dioxide emissions using electric- and engine-powered machines and appliances. How could they reduce their contribution to carbon dioxide emissions and lessen the impact of global warming?

Pregunte a los alumnos:

¿De qué maneras contribuyen ustedes a la emisión del anhídrido carbónico al usar máquinas electricas o aparatos de motor ? ¿Cómo pueden reducir su contribución al aire de las emisiones de anhídrido carbónico y reducir el impacto del calentamiento global?

Extension Activity

Provide time for students to graph the results of their "Inside the Greenhouse" experiment. How do the graphs for Thermometer 1 and Thermometer 2 compare? Are the graphs a good way to display this data?

Closing (10 minutes)

Have students share with the class some of the ways in which they contribute to carbon dioxide emissions. Remind them that, in the following lesson, they will need the data they collected from their investigations.

Parent Link

Much of the information that has been discovered about global warming is recent and many of our parents are not informed about this topic. Yet, they too have been noticing climate changes that have been effecting us all in recent years. They know winters are either much colder or warmer than before. They see temperatures in the summer that nearly bankrupt them from air-conditioning electricity bills (if they can afford to have air conditioning in the first place). Send home materials on this topic in the parents' native language. They can learn about ways to affect the global warming process, and take measures to help correct this problem.

Enlace familiar

Mucha información que se ha descubierto acerca del calentamiento global es muy reciente y muchos de nuestros padres no están informados sobre este tema. Aún así, ellos están notando cambios en la temperatura que han estado afectando a todos en estos últimos años. Ellos saben que los últimos inviernos han sido más frios o un poco más calientes que los de años anteriores. También la temperatura del verano ha sido muy alta y el uso del aire acondicionado (para aquellos que cuentan con un sistema) la cuenta de la lúz eléctrica ha sido muy elevada, causando grandes dificultades económicas. Envíe a casa información de este tema en el idioma nativo de los padres. Los padres pueden aprender acerca de las formas en que se afecta al proceso de calentamiento global y tomar medidas para ayudar a corregir este problema.

Literature Link

In *The Talking Earth*, Billie Wind lives with her Seminole tribe and follows their customs, but the dangers of pollution and nuclear war she's learned about in school seem much more real to her. She questions the Seminole "legends" about talking animals and earth spirits but, in the wilderness, discovers that she must listen to both animals and land in order to survive, and that her people's "way" can give her the answers she needs. This book is written by Jean Craighead George, and is recommended for grades 5-7.

Handout 41.1

Recording Temperatures

Thermometer 1:

1st reading: ____________________

2nd reading: ____________________

3rd reading: ____________________

4th reading: ____________________

5th reading: ____________________

6th reading: ____________________

7th reading: ____________________

8th reading: ____________________

9th reading: ____________________

10th reading: ____________________

11th reading: ____________________

Thermometer 2:

1st reading: ____________________

2nd reading: ____________________

3rd reading: ____________________

4th reading: ____________________

5th reading: ____________________

6th reading: ____________________

7th reading: ____________________

8th reading: ____________________

9th reading: ____________________

10th reading: ____________________

11th reading: ____________________

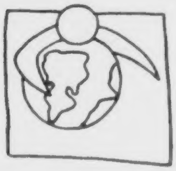
Hoja de trabajo 41.1

Anotación de temperaturas

Termómetro 1:	Termómetro 2
Primera lectura: ____________	Primera lectura: ____________
Segunda lectura: ____________	Segunda lectura: ____________
Tercera lectura: ____________	Tercera lectura: ____________
Cuarta lectura: ____________	Cuarta lectura: ____________
Quinta lectura: ____________	Quinta lectura: ____________
Sexta lectura: ____________	Sexta lectura: ____________
Séptima lectura: ____________	Séptima lectura: ____________
Octava lectura: ____________	Octava lectura: ____________
Novena lectura: ____________	Novena lectura: ____________
Décima lectura: ____________	Décima lectura: ____________
Décima primera lectura: ____________	Décima primera lectura: ____________

Lesson 42

Global Warming: Inside the Greenhouse (Part II)
El calentamiento global: Adentro del invernadero (Parte II)



Overview

In this lesson, students continue learning about global warming and the greenhouse effect. They work together to analyze and interpret data, and synthesize the information into a report on ***global warming***.

Resumen

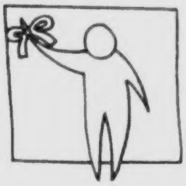
En esta lección los alumnos siguen estudiando el calentamiento global y el "efecto de invernadero". Trabajan juntos al analizar e interpretar datos y sintetizan la información en un reporte sobre el ***calentamiento global***.

Key Skills

Graphing
Interpreting
Synthesizing
Reporting
Writing
Drawing conclusions

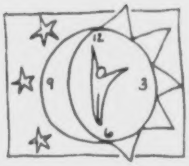
Destrezas claves

Hacer gráficas
Interpretar
Sintetizar
Reportar
Redactar
Sacar conclusiones



Preplanning

1. Gather available news articles on global warming and the greenhouse effect.
2. Review the articles and synthesize the information they provide.



Suggested Time

10 minutes — Welcoming
45 minutes — Homework/Learning Options
35 minutes — Analyzing and Interpreting Data
20 minutes — Journal
10 minutes — Closing

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2 hours total

Materials

A teacher and teaching assistant will be needed to implement this lesson. The following materials will be needed:

- ☆ News articles on global warming and the greenhouse effect.
- ☆ Copies of Handout 42.1, "Average Global Temperature" (one for each cooperative learning group).
- ☆ Pencils and paper for each group.

Suggested Quote/Cita sugerida

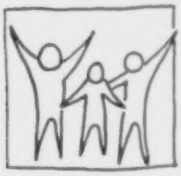
I hope you will go out and let stories happen to you, and that you will work them, water them with your blood and tears and your laughter till they bloom, till you yourself burst into bloom. Then you will see what medicine they make, and where and when to apply them.

—Clarissa Pinkola Estés as quoted in *The Fire in Our Souls*

Ms. Pinkola Estés is a writer, Jungian analyst, and specialist in cross-cultural mythology. She is the author of several books, including *Women Who Run with the Wolves*.

Espero que salgas al mundo y permitas que te pasen historias, que trabajes con ellas, que las riegues con tus lágrimas, sangre, y carcajadas hasta que estas florescan, hasta que tú misma(o) brotes como una flor. Después verás que medicina hacen, y cuando y donde las aplicarás.

—Clarissa Pinkola Estés



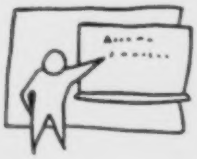
Welcoming (10 minutes)

Welcome students and provide a few minutes for them to update team and class recycling charts.

Much of the information that the public sees about global warming comes in the form of graphs or charts displayed in journals and news articles. Share with students your example of news articles on global warming and the global warming charts. Explain to them how both offer important information about global warming. The articles express ideas through writing and the graphs present information through a graphic or visual representation. Both the articles and graphs provide information that has been researched and/or tested through experiments. Explain to students that, like scientists and researchers, they will use the data they have collected and graphs they have been given, to write their own news article on global warming.

Homework/Learning Options (45 minutes)

Students should use this time to complete homework, receive individual tutoring or assistance, or engage in free reading.



Curriculum

Analyzing and Interpreting Data (35 minutes)

Before students begin the next activity, share with them some of the information from the "Background for the Teacher" section in Lesson 40. In particular, tell students that some scientists who study the earth's climate predict that if people continue to burn so much carbon and produce so much carbon dioxide, the Earth will warm by two to five degrees Celsius by the year 2050. This would harm many plants and all animals who rely on those plants and water.

Distribute Handout 42.1, "Average Global Temperature" to each cooperative learning team. In this activity, students plot points on a graph for a particular temperature drop, or increase, in Celsius for a given year in history. Model the first example by plotting the temperature in 1901 at -.2°C Explain to students what this point on the graph means: In 1901, the temperature was .20 below what scientists consider the normal temperature for the earth. Make sure students understand that ".20" means "2 parts" of one degree. The temperature was not 20 below. Provide information for the following years listed below. Make sure each cooperative learning team has plotted this point correctly before moving on to the next year. Encourage discussion among team members regarding the plotting of each point.

1910: .5 degrees *below* "Normal"
1920: .1 degrees *below* "Normal"
1930: .4 degrees *below* "Normal"
1940: .1 degrees *above* "Normal"
1950: .2 degrees *below* "Normal"
1960: .1 degrees *above* "Normal"
1970: .2 degrees *above* "Normal"
1980: .5 degrees *above* "Normal"
1988: .8 degrees *above* "Normal:

Explíque a los alumnos:

"En esta actividad, ustedes van a anotar puntos en la gráfica que dan una baja o un aumento en la temperatura Celsius durante algún año en particular. En este ejemplo, vamos a anotar la temperatura en 1901 a -.2°C Esto quiere decir que en 1901, la temperatura estaba a .20 menos de lo que los científicos consideraban normal para la temperatura de la Tierra,".20" quiere decir "2 partes" de un grado. La temperatura no estaba a 20 bajo cero".

Provea información para los años que se encuentran en el listado a continuación. Asegúrese de que cada grupo de aprendizaje cooperativo haya marcado cada año individualmente antes de confirmar con el próximo. Anime a los miembros de los grupos a charlar sobre cada uno de los puntos que marquen.

1910: .5 grados *bajo* "Normal"
1920: .1 grados *bajo* "Normal"
1930: .4 grados *bajo* "Normal"
1940: .1 grados *sobre* "Normal"
1950: .2 grados *bajo* "Normal"
1960: .1 grados *sobre* "Normal"
1970: .2 grados *sobre* "Normal"
1980: .5 grados *sobre* "Normal"
1988: .8 grados *sobre* "Normal"

Once students have completed plotting their temperatures, allow them the necessary time to think about the data represented in their new graph. Tell them that connecting the points of their graph may help them read it. Ask them to think about the data they plotted. What does the data represent? What does their cooperative learning team think is happening to the temperature of the globe?

Pregúnte a los alumnos:

"¿Qué representan los datos? ¿Qué cree su equipo que esté pasando con la temperatura del globo?"

Allow students approximately five to ten minutes to think about the questions regarding the graph. If time permits, ask them to continue discussing what information they can gather from looking at the graph. It is important to allow all groups to discuss their ideas so that they are able to recall them during the writing activity. Ask students to think about the following questions:

☆ What does the graph tell us about history? [The increase in the use of automobiles coincides with an increase in global temperature.]

☆ How is the data of the graph related to global warming?

☆ If we continue to plot the increase or decrease in global temperature, where do you think our next point on the graph would be? Higher or lower than where it was in 1988?

☆ What conclusions can be drawn about global warming and the greenhouse effect?

☆ What can we do about global warming?

After students have discussed these questions, provide time for each cooperative learning team to share their answers and ideas with the rest of the class.

Pregúnte a los alumnos:

☆ ¿Qué nos dice la gráfica acerca de la historia? [El aumento del uso de automóviles coincide con el aumento de la temperatura global].

☆ ¿Cómo se relacionan los datos de la gráfica con el calentamiento global? Si seguimos anotando el aumento o la baja de la temperatura global, ¿dónde creen que estará el siguiente punto de la gráfica? ¿Más alto o más bajo que en 1988?

☆ ¿Qué conclusiones podemos sacar sobre el calentamiento global y el efecto de invernadero?

☆ ¿Qué podemos hacer para reducir el calentamiento global?

Journal (20 minutes)

Have students work individually (or cooperatively if they are in the lower grades) to write a short article about global warming for a newspaper's front-page story. Remind them to include all the data they have discussed. They may want to include their graph as an illustration.

Closing (10 minutes)

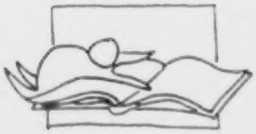
Briefly review the concept of global warming. Ask a few volunteers to share their news article with the class. Tell them that in the next lesson they will study ***soil erosion**, which can also cause harm to the environment.

Parent Link

Have students explain to parents what they learned about global warming in this lesson. In preparation for the next lesson on soil erosion, ask them to conduct the experiment that is included here as Handout 42.2 as a group. If an aquarium is not available, students may conduct this experiment outside.

Enlace familiar

Diga a los estudiantes que expliquen a sus padres lo que aprendieron en esta lección sobre el calentamiento global. Pída a los alumnos que en preparación para la próxima lección que trata de la erosión de la tierra hagan juntos el experimento incluído como la Hoja de trabajo 42.2. Si no tienen acceso a un acuario, los estudiantes pueden hacer este experimento afuera.

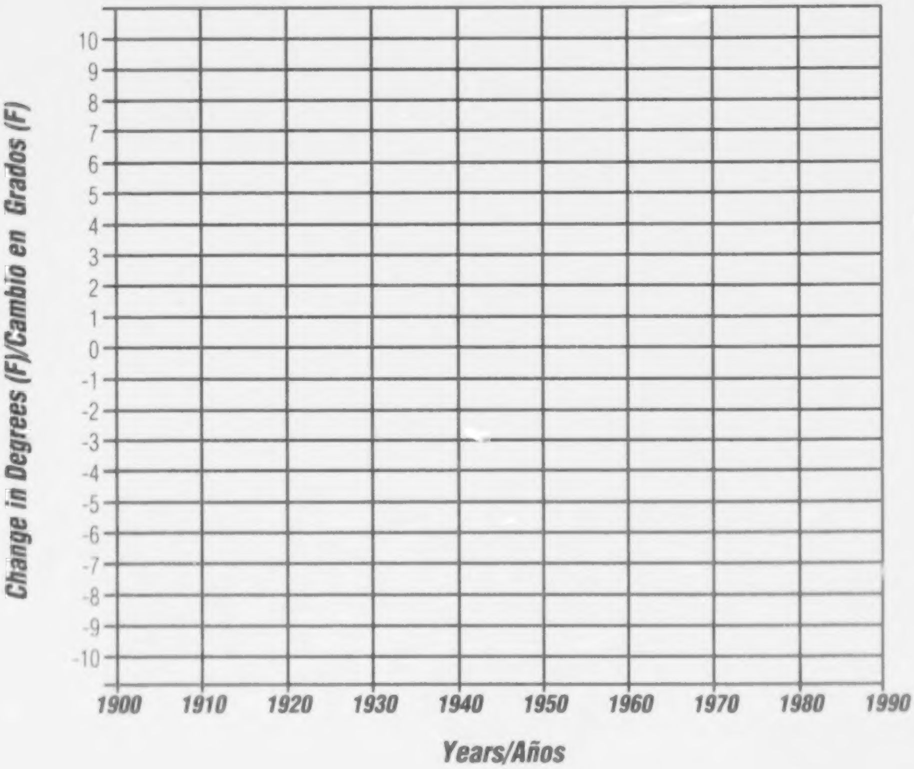


Literature Link

The Great Kapok Tree: A Tale of the Amazon Rain Forest, by Lynne Cherry, tells the story of rainforest animals who convince a man not to cut down their home. The importance of trees provides a literature link to the topic of global warming. Recommended for grades K-4.

Handout 42.1

Average Global Temperature
Promedio de la Temperatura Global



Handout 42.2

Jean Potter's "Erosion Stopper: Can Erosion be Prevented?"

You will need the following materials for this activity:

Sand, soil, twigs, small sprinkling can, tap water, an aquarium.

If you don't have access to an aquarium, don't worry. You can still conduct this experiment if you do it outside. If it is too difficult for you to pour water over the mound and observe what is happening at the same time, have a family member help you.

Follow these steps:

1. Mix the sand and soil together in the aquarium. (If you don't have one, mix the sand and soil together in a box and form the soil into a mound outdoors, on a flat area.)
2. Form the soil into a mound.
3. Stick the twigs into the soil on one side of the mound only to represent trees and plants.
4. Using the sprinkling can, water the mound as if it were raining fairly hard on both sides of the mound at the same time. What happens to each side of the mound?
5. Discuss your observations with your family member. Then, jot them down in your family nature walk journal.

Erosion is what happens when rock or soil is worn away slowly, by water, wind, or man-made chemicals. Plants "anchor" their roots in the earth, which helps prevent the soil from washing away. The twigs represented plants anchored in soil. More soil was left on the side with the twigs when you watered the mound. Most of the soil on the side without the twigs washed away. Trees and other plant life prevent soil from washing away when it rains.

Hoja de trabajo 42.2

"El parador de la erosión" de Jean Potter: "¿Se puede prevenir la erosión de la tierra?"

Para esta actividad van a necesitar los siguientes materiales:

Arena, tierra, ramitas, una pequeña lata para rociar, agua de la regadera, un acuario.

Si no tiene acceso a un acuario no se preocupe. Puede hacer el experimento afuera. Si tiene dificultad para echar agua sobre el montículo y observar lo que está pasando al mismo tiempo, pídale a un familiar que lo ayude.

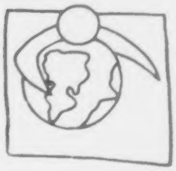
Siga los siguientes pasos:

1. Mezcle la arena y la tierra dentro del acuario. (Si no tiene un acuario, mezcle la arena y la tierra en una caja y forme un montículo con la mezcla en una superficie plana).
2. Haga un montículo con la tierra.
3. Ponga la ramita en un lado del montículo de tierra (solo) para representar los árboles y las plantas.
4. Usando la lata para rociar eche agua sobre ambos lados del montículo al mismo tiempo como si estuviera lloviendo fuertemente. ¿Qué pasa con ambos lados del montículo?
5. Discuta sus observaciones con un miembro de su familia. Luego anote estas en su diario.

La erosión es un fenómeno en el cúal la roca o la tierra se desgasta lentamente y paso a paso. Las plantas "sujetan" sus raices en la tierra. Esto previene que la tierra sea arrastrada por el agua. Las ramitas representan las plantas que se sujetan en la tierra. Cuando se rocia el montículo con agua sobra más tierra en el lado que se colocaron las ramitas. La mayor parte de la tierra del lado que no tiene ramitas fue arrastrada por el agua. Los árboles y otras plantas previenen que la tierra sea arrastrada por el agua de la lluvia.

Lesson 43

The Watering Can
La regadera



Overview

In this lesson, students learn about soil erosion and the conditions under which it occurs. They perform a soil erosion test and investigate the rate at which soil absorbs water within particular environments. This activity was developed by the National Science Foundation for National Science and Technology Week.

Resumen

En esta lección, los alumnos estudian la erosión de la tierra y las condiciones en que ocurre. Hacen una prueba de erosión de la tierra e investigan cómo la tierra absorbe agua en un ambiente específico. Esta actividad fue desarrollada por el National Science Foundation para la Semana Nacional de Ciencia y Tecnología.

Key Skills

Measuring
Observing
Comparing
Contrasting
Making decisions

Drestrezas claves

Medir
Observar
Comparar
Contrastar
Tomar decisiones

Preplanning

1. Make arrangements with appropriate personnel to allow students access to areas with loosely-packed dirt, a grassy area, a hard dirt path, and a paved area.

2. Read "Background for the Teacher."
3. Review the following terminology:

* *soil erosion*	* *erosión de la tierra*
* *absorb*	* *absorber*
* *surface*	* *superficie*

Background for the Teacher

Soil is a renewable resource. The top layer of soil is a mixture of rocks and mineral particles, such as water, air, organic substances and microorganisms.

Minerals in the soil are replaced slowly. If farmers try to plant too many crops on the same land, or if they sow it too often, the minerals in the soil can be used faster than they can be replaced. Not all plants use the same minerals, or the same amount of minerals. By fertilizing and alternating crops that have different mineral needs, agriculturalists can maintain the soil without the loss of many minerals.

In order to maintain the soil, especially the top layer, a good vegetation cover is important. The cover of plants could be lost if a crop fails, if animals like cows or sheep are allowed to graze excessively, or if there is a fire. Without the plants that hold loose particles of the soil together, the soil can be washed away with water or blown away with wind. When soil is washed away by water or blown away by wind, this is called ***soil erosion**.

Most ***soil erosion** occurs when the soil is either soaked with water or is unable to absorb water quickly enough. Then, more water runs over the surface washing away soil with it. The greater the amount of water, the faster it moves, and the larger the materials it is able to carry.

***Soil erosion** can be very costly, especially when it occurs in large areas of cultivation. There are a number of ways to prevent or reduce ***soil erosion**; for example, by various means of cultivation that minimize water run-off, or mineral depletion. Planting trees or bushes reduces erosion caused by the wind.

Información para el/la maestro/a

La tierra es un recurso renovable. La capa superior de la tierra es una mezcla de piedras y partículas minerales, como agua, aire, substancias orgánicas y microorganismos.

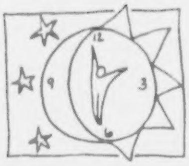
Los minerales de la tierra se reponen lentamente. Si los agricultores tratan de sembrar demasiados cultivos en el mismo terreno, o si siembran con demasiada frecuencia, los minerales se pueden desgastar antes de que se puedan reponer. No todas las plantas utilizan los mismos minerales, ni la misma cantidad de

minerales. Al fertilizar y rotar los cultivos que necesitan los mismos minerales, los agricultores pueden mantener la tierra sin que se pierdan muchos minerales.

Para mantener la tierra, sobre todo la capa superior, es importante tener una buena capa de vegetación. Esta cubierta de plantas se puede perder si falla una cosecha, o si se permite pastar demasiado a los animales, como las vacas, o si hay un incendio. Sin las plantas que sujetan las partículas sueltas de la tierra, el agua la puede arrastrar, o el viento se la puede llevar. A esto se le llama ***erosión de la tierra**.

Gran parte de la ***erosión de la tierra** ocurre cuando la tierra está empapada de agua, o no puede absorber suficientemente. Entonces corre más agua por la superficie, llevándose la tierra. Mientras más agua haya, más rápido se mueve, y más grande es el material que se puede llevar.

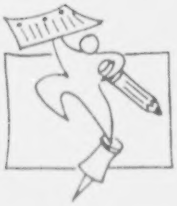
La ***erosión de la tierra** puede ser muy costosa, sobre todo cuando ocurre en areas grandes de cultivo. Hay varias maneras de evitar o reducirla, por ejemplo por medio de varios tipos de cultivo que reduzcan el deslave del agua o el desgaste de minerales. Si se siembran árboles o arbustos se reduce la erosión causada por el viento.



Suggested Time

10 minutes — Welcoming
45 minutes — Homework/Learning Options
15 minutes — Guided Discussion
15 minutes — Watering Can Experiment
20 minutes — Exploration Activity
15 minutes — Closing

2 hours total



Materials

The teacher and two teaching assistants are needed to fully implement this lesson. You will need the following materials:

- Several soup-size tin cans with both ends removed.
- A bucket of water.
- A watch with a second hand (one for each cooperative learning group).
- Modeling clay to seal cans to blacktop.
- Handout 43.1, "Recording Our Results" (one for each student).

Suggested Quote/Cita sugerida

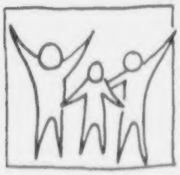
I hope you will go out and let stories happen to you, and that you will work them, water them with your blood and tears and your laughter till they bloom, till you yourself burst into bloom. Then you will see what medicine they make, and where and when to apply them.

—Clarissa Pinkola Estés as quoted in *The Fire in Our Souls*

Ms. Pinkola Estés is a writer, Jungian analyst, and specialist in cross-cultural mythology. She is the author of several books, including *Women Who Run with the Wolves.*

Espero que salgas al mundo y permitas que te pasen historias, que trabajes con ellas, que las riegues con tus lágrimas, sangre, y carcajadas hasta que estas florescan, hasta que tú misma(o) brotes como una flor. Después verás que medicina hacen, y cuando y donde las aplicarás.

—Clarissa Pinkola Estés



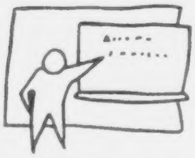
Welcoming (10 minutes)

Welcome students and take attendance. Preview the day's activities and review the rules that have been established for working in cooperative learning groups.

Tell students that today they will be learning how ***soil erosion** occurs. Introduce the topic of ***soil erosion** by providing students with some background information.

Homework/Learning Options (45 minutes)

Students may use this time to complete homework, receive individual tutoring, or assistance or engage in free reading. Students should also add any new words or terms they've learned to their word banks.



Curriculum

Guided Discussion (15 minutes)

Explain that soil erosion is a worldwide problem. The amount of soil carried away by large rivers like the Mississippi, the Amazon, and the Nile may turn the river so brown it can be seen from an airplane many miles out at sea.

Explíque a los alumnos:

La erosión de la tierra es un problema mundial. La cantidad de tierra que se llevan los ríos grandes como el Mississippi, el Amazonas y el Nilo hace que el agua se vea tan café que se puede ver a varias millas desde un avión volando sobre el océano.

Ask students:

"Where do you think this large quantity of soil comes from? What happens to the land after the soil is swept away? Do you think this is good for the people who live on the land?"

Pregúnte a los alumnos:

"¿De dónde creen que venga toda esta tierra? ¿Qué les pasa a los campos después que se deslava la tierra? ¿Creen ustedes que esto sea bueno para la gente que vive allí?"

Tell students that plants hold soil in place. If plants are removed or destroyed, the soil can be easily washed or blown away. Plants can be destroyed by many things, such as overgrazing by cattle or other animals, plowing for farming, or cutting trees for lumber.

Most erosion occurs when the soil is either soaked with water, or is unable to absorb water quickly enough. More water then runs over the surface, washing away soil with it. The greater the amount of water, the faster it moves, and the larger the materials it is able to carry.

Tell students that the activity you will do today will show the different rates at which soil absorbs water. Here are some questions for them to consider during this experiment. How long do you think it will take the can of water to soak into the soil? Do you think it might take longer in different kinds of soil?

Díga a los alumnos:

"En la actividad de hoy vamos a ver cuan rápido puede la tierra absorber el agua. Aquí hay algunas preguntas en que pensar durante este experimento. ¿Cuánto creen que se tarde la tierra en absorber una lata de agua? ¿Creen que tardaría más o menos en diferentes tipos de tierra? ¡Hagan sus predicciones!"

Watering Can Experiment (15 minutes)

Ideally, this experiment should be conducted in a flower bed or some other place with easily accessible dirt. If space is limited, try to locate an area with loosely packed dirt.

Assign students to their cooperative learning groups and have them select the following roles within each group: Supplies Monitor, Time Keeper, Recorder, Reporter, Praiser.

Distribute supplies to the Supplies Monitor who, in turn, will make sure everyone in the group has appropriate supplies. After you have distributed materials, model the activity and then have students follow the same procedure:

1. Take one of the tin cans and push it one end down into the soil about ½ inch.
2. Working quickly, use the water from the bucket to fill the can to the top.
3. Use your watch to measure how long it takes all of the water to soak into the soil.
4. Record the results of your experiment, using Handout 43.1. Results should be in the first column marked for "Loosely Packed Dirt."

Demuestre la siguiente actividad a los alumnos para que ellos la repitan:

1. Tomen una lata y metan un extremo en la tierra, más o menos a media pulgada de profundidad.
2. Rápidamente llene la lata hasta el borde con agua de la cubeta.
3. Con el reloj, observe cuánto tiempo tarda la tierra en absorver el agua.
4. Anote los resultados de su experimento, usando la Hoja de trabajo 43.1. Anótelos en la primera columna, "Tierra suelta".

Exploration (20 minutes)

Explain to students that they will now perform the same experiment to determine how well the soil in the different areas surrounding the classroom absorbs water. Students will continue to work in their cooperative learning teams. Each group should choose different members of the group to carry equipment, be the time-keeper to pour the water, and record observations. Make sure that each student is assigned a specific task.

Have each group (with teaching assistants supervising) repeat the experiment in the following types of areas in and around the classroom: a grassy area, a hard dirt path, and a paved area. (Seal the can to the pavement with modeling clay to prevent leakage.) Each group rotates to a new area after having completed the experiment. Students will record the time it took for the water to be absorbed on Handout 43.1.

Closing (15 minutes)

Involve students in a discussion that reviews today's experiment and students' findings, and that addresses the following questions: What kinds of areas will best withstand erosion? Where will the water run off? What can a person do to help prevent soil erosion?

Converse con los alumnos sobre la actividad de hoy y los resultados que obtuvieron durante su experimento, y asegurese de tratar las siguientes preguntas: ¿Qué áreas resisten mejor la erosión de tierra? ¿En dónde se deslavará el agua? ¿Qué pueden hacer para ayudar a evitar la erosión de tierra?

Review the problems soil erosion can cause and why it is an important issue to consider. Remind students that in the next lesson, we will continue studying soil and land. Specifically, we will begin to explore the ways in which we contaminate the land by the way we dispose of waste. Inform students that to simulate what happens when we bury trash in landfills, each student will need to bring in trash.

Parent Link

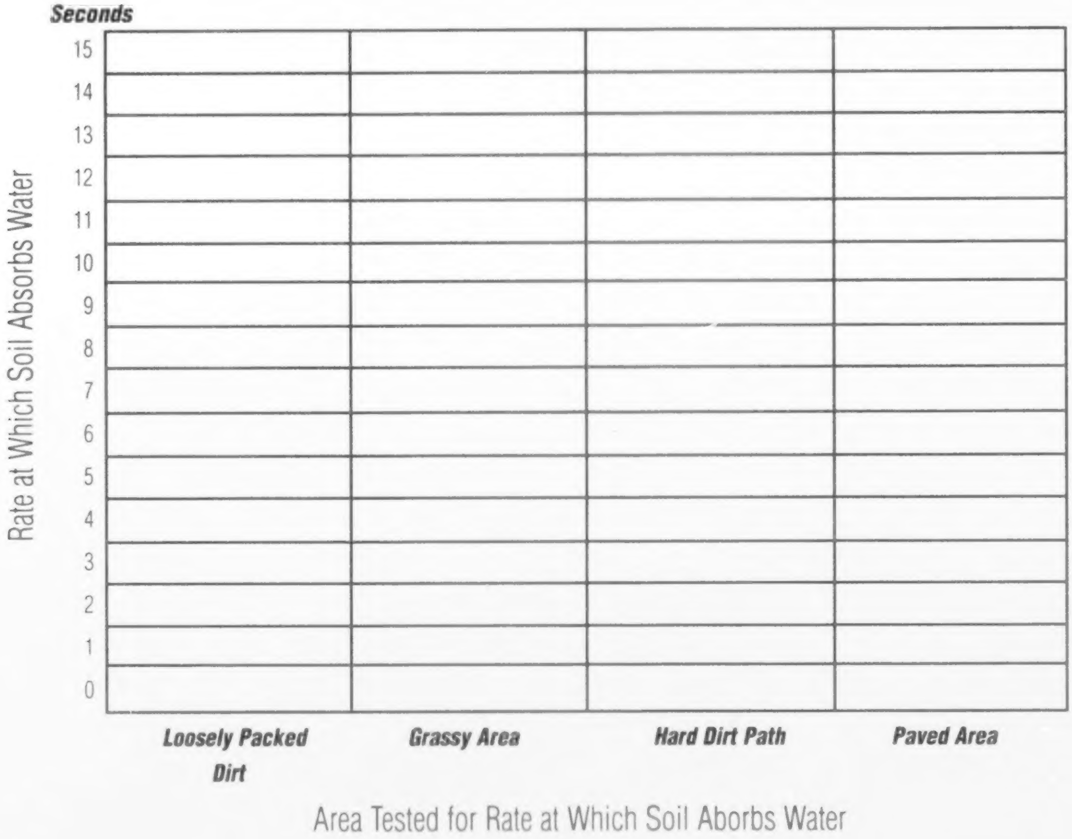
This is a wonderful opportunity to encourage parents and students to visit their local library, to explore the children's book section for videos and books on soil erosion that deal specifically with both the problems and solutions faced in this area by different parts of Latin America. For both parents' use and yours, you might want to contact PBS for information about specific programs they have aired on this topic and how to get a hold of them. (Turn to the "Resources" section for information on contacting PBS.)

Enlace familiar

Esta es una buena oportunidad para incentivar a los padres y estudiantes a visitar la biblioteca local y explorar la sección de libros para niños y videos sobre la erosión de la tierra que tratan específicamente los problemas y soluciones que enfrentan los diferentes paises de Latino América. Para el uso de los padres y del maestro, sería buena idea contactar el canal de televisón PBS para obtener información acerca de programas específicos que ellos hayan transmitido sobre este tema y de qué manera se pueden conseguir estos. (Vea la sección de "recursos" para obtener información sobre cómo contactarse con PBS.)

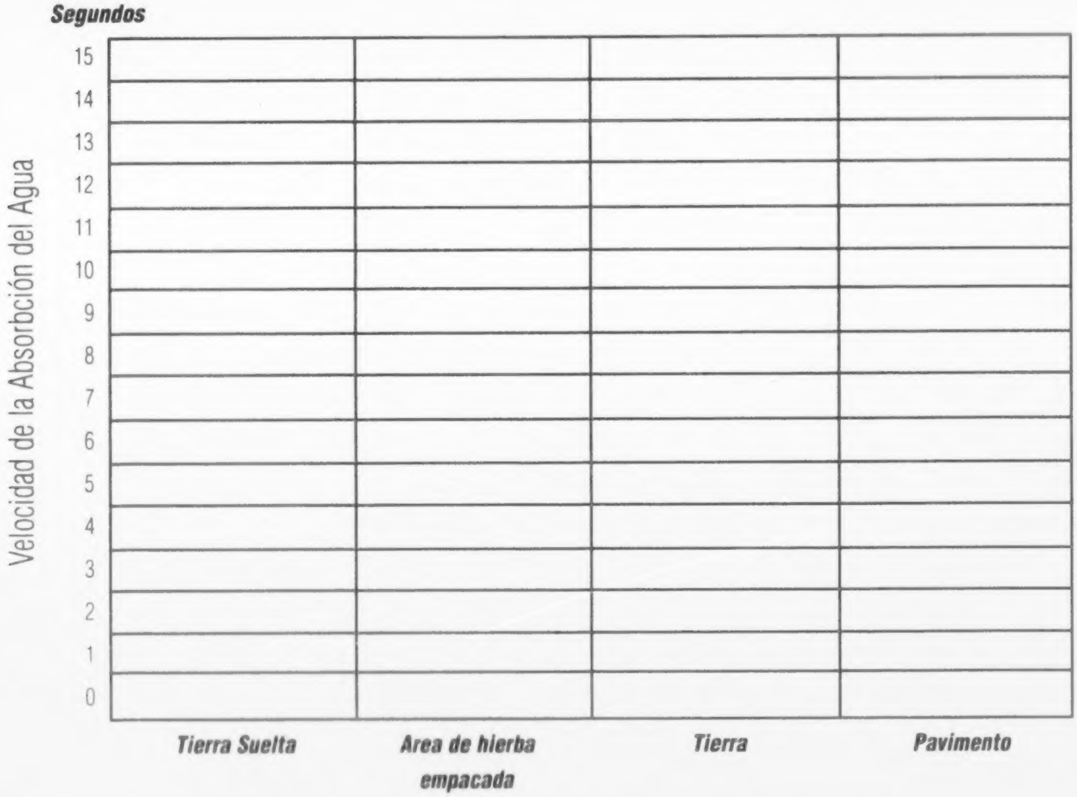
Handout 43.1

The Watering Can Experiment
Recording Our Results



Handout 43.1

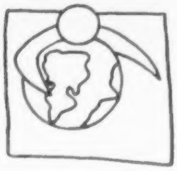
El experimento de la regadera
Apuntamos los resultados



Area Probada Para Ver Cuanto Tarda La Tierra En Absorber El Agua

Lesson 44

Down In The Dumps
¡Al basurero no!



Overview

Waste disposal in this country has become a major problem. In this lesson, students discuss the various ways in which we dispose of our trash. They learn why landfill disposal might not be the best solution for getting rid of our trash. By creating their own landfill and observing how trash degrades over time, students make this discovery.

Resumen

En este país, la disposición de desechos se ha convertido en un problema muy serio. En esta lección los alumnos estudian diferentes maneras de disponer de la basura. Aprenden porqué los vaciaderos de desechos no son la mejor solución. Al crear su propio vaciadero y observar cómo se degrada la basura a través del tiempo, los alumnos hacen este descubrimiento.

Key Skills

Experimenting

Observing

Predicting

Writing

Destrezas clave

Experimentar

Observar

Predecir

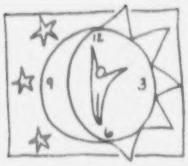
Escribir

Preplanning

1. Two days before conducting this activity, ask students to bring in trash.
2. Review the following terminology:

   * *waste disposal* * *disposición de desechos*

* *degrade*	* *degradar*
* *landfill*	* *vaciadero de basura*



Suggested Time

10 minutes — Welcoming
45 minutes — Homework/Learning Options
20 minutes — Guided Discussion
20 minutes — Down in the Dumps
15 minutes — Debriefing/Journal
10 minutes — Closing

2 hours total

Materials

A teacher and teaching assistant are needed to implement this lesson. You will need the following materials:

- ☆ Two large glasses or plastic containers that will not be needed for several months (two per group).
- ☆ Soil to fill the containers.
- ☆ Water, towel and large spoon (one per group).
- ☆ Trash — small pieces of paper, cardboard, orange peel, pieces of wood, "tin" can, small plastic bag (two pieces of each kind of trash per group).

Suggested Quote/Cita sugerida

I hope you will go out and let stories happen to you, and that you will work them, water them with your blood and tears and your laughter till they bloom, till you yourself burst into bloom. Then you will see what medicine they make, and where and when to apply them.

—Clarissa Pinkola Estés as quoted in *The Fire in Our Souls*

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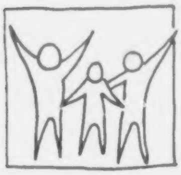
Espero que salgas al mundo y permitas que te pasen historias, que trabajes con ellas, que las riegues con tus lágrimas, sangre, y carcajadas hasta que estas florescan, hasta que tú misma(o) brotes como una flor. Después verás que medicina hacen, y cuando y donde las aplicarás.

—Clarissa Pinkola Estés

SESSION PLAN

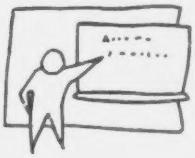


Welcoming (10 minutes)

Welcome students and take attendance. Provide students with time to update their team recycling charts and the class recycling chart. To introduce the lesson, tell students to think of the things that they've thrown away today. Make a quick list on the board.

Homework/Learning Options (45 minutes)

Students may use this time to complete homework, receive individualized tutoring or assistance, or engage in free reading. They should add any new words or terms they learn today to their wordbanks.



Curriculum

Guided Discussion (20 minutes)

Discuss with students what they think happens to trash after they dispose of it. Brainstorm ideas on ways of getting rid of trash. Elicit from students several suggestions. Some that may come up include: taking garbage out to sea and dumping it, burning it, taking it to the desert, etc.

Share the following with students:

"We create a lot of trash, but how can we get rid of it without causing other problems? What happens if we burn it? [It creates air pollution.] What happens if we take it out to sea or to the desert? [We endanger the lives of the sea and desert environment.] Even if we bury it in a dump or ***landfill**, it stays around for a long time. In fact, the more we study landfills, the more we understand why burying trash is not a final way to dispose of things we no longer want. Of course, any trash will finally rot away (scientists call this ***degradation**) but it's surprising how long it takes for this to happen."

"Various conditions affect how long it takes an object or thing to rot or ***degrade**; for example: the temperature, the type of soil, the amount of moisture, and how large the object is. If you put the following objects in a landfill, this is about how long it will take for them to 'vanish': papers — about 30 days; cotton rags — about 6 months; unpainted wood — up to 4 years; painted wood — 12 to 15 years; 'tin' (steel) cans — 100 years; plastic containers - up to 500 years; and glass containers — too long to even guess! The easiest way to see how a landfill works is to create a miniature one, then wait and watch! That is what we will do together today."

Dígale a los alumnos:

"Creamos mucha basura pero ¿cómo podemos deshacernos de ella sin crear más problemas? ¿Qué pasa si la quemamos? [Contaminamos el ambiente]. ¿Qué pasa si la tiramos al mar o en el desierto? [Ponemos en peligro a los animales que viven ahí]. Aunque la enterremos en un ***vaciadero de basura**, ahí duraría mucho tiempo. La verdad es que mientras más estudiamos los ***vaciaderos de basura**, mejor comprendemos que el enterrar la basura no es la manera final de disponer de lo que ya no sirve. Por supuesto, toda la basura con el tiempo se deshace (los científicos le llaman a esto ***degradarse**), pero es impresionante ver cuanto tarda en pasar."

"Varias son las condiciones que afectan el tiempo que tarda un objeto en degradarse; por ejemplo: la temperatura, el tipo de tierra, la cantidad de humedad y el tamaño del objeto. Si echáramos estas cosas a un vaciadero de basura, este es el tiempo que más o menos tardarían los objetos en degradarse: papel — 30 días; trapos de algodón — 6 meses; madera sin pintar — hasta 4 años; madera pintada — 12 a 15 años; latas de estaño (acero) — 100 años; recipientes de plástico — hasta 500 años; y recipientes de vidrio — ¡tanto que ni se puede imaginar! La manera más fácil de ver cómo funciona un vaciadero de basura es crear uno en miniatura, y luego, ¡esperar y observar! Esto es lo que vamos a hacer hoy".

Down in the Dumps (20 minutes)

In this experiment, students will be making their own landfill, depositing various kinds of trash, and seeing how long different types of trash take to ***degrade**. Have students work in their cooperative learning groups and follow these steps:

1. Put a two-inch deep layer of soil in one large container. This is a new landfill and a bulldozer has just dug a big hole.
2. Place *one* piece of each kind of trash on top of the soil in this container.
3. Cover the trash in the ***landfill** with another three inches of soil. The bulldozer has pushed the dirt over the trash to fill in the hole it made. (This is how a real landfill works.) To make it more realistic, let it "rain" on your landfill by pouring some water on top of the soil.
4. In the empty container, place one piece of each kind of trash you deposited in the first container. This container has no soil.
5. Put both containers in a safe place where you will be able to find them again in a couple of weeks or a month. Place your landfill (the container with soil) where nobody will disturb it. If you put food items in it, they might smell a bit, so placing it somewhere outside might be best.

Díga a los alumnos:

1. Pongan una capa de dos pulgadas de tierra en un recipiente grande. Este es un nuevo vaciadero de basura y un bulldozer acaba de hacer un hoyo muy grande.
2. Pongan una pieza de cada tipo de basura sobre la tierra del recipiente.
3. Tapen la basura del "vaciadero" con otras tres pulgadas de tierra. El bulldozer ha tapado la basura con tierra para rellenar el hoyo que hizo. (Así funciona un vaciadero real). Para hacerlo más real, hagan "llover" sobre el vaciadero, dejando caer un poco de agua sobre la tierra.
4. En el recipiente vacío, pongan una pieza de cada tipo de basura que pusieron en el primer recipiente. Este no contiene tierra.
5. Pongan los dos recipientes en un lugar seguro donde los puedan volver a encontrar dentro de dos semanas o un mes. Pongan el vaciadero (el recipiente con tierra) donde nadie lo toque. Si le ponen desechos de comida quizás empiece a oler mal, así es que será mejor colocarlo afuera.

Debriefing (15 minutes)

Tell the class that they will look at their trash again in the next unit. Ask them what they think they will find. Ask each group to make predictions based on the following questions:

"Do you think that you will find all the pieces of trash in a couple of weeks? Will all of them ****degrade*** away completely? Which pieces will be only partially degraded? Which ones will look exactly the same?" Predictions should be recorded in journals and compared to actual results in the next unit.

Pidale a los alumnos que hagan sus predicciones sobre las siguientes preguntas:

"¿Ustedes creen que hallarán todas las piezas de basura? ¿Cuáles piezas creen que se degradarán completamente? ¿Cuáles se degradarán parcialmente? ¿Cuáles quedarán exactamente iguales que antes?"

Closing (10 minutes)

During this time, allow each group to present their predictions to the rest of the class. Discuss differences and similarities in predictions and how these predictions were formulated.

Parent Link

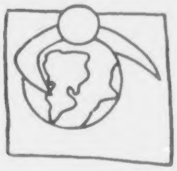
Take advantage of this opportunity to get families thinking about recycling in the home. Call your local municipality for information about what they do and do not accept for recycling. They often publish brochures and flyers that are sent directly to homes. You can have students observe how much garbage (the numbers of bags) that are put out by their family every day or two, if they do not currently recycle. Involve students in devising a recycling plan for their families (how garbage will be organized and prepared for recycling, where it will be placed in the home, etc.). After a week or two of recycling, have students do a tally of how much garbage is put out by the family now that they recycle. In cities that do not recycle, or where only newspaper, and glass or plastic is accepted for recycling, there are often companies that will recycle other materials in the home (mail envelopes with the windows removed, colored paper, plastics other than numbers "2" and "6") for a small fee per month.

Enlace familiar

Tome ventaja de esta oportunidad para conocer las ideas de la familia sobre el reciclaje en la casa. Llame a su alcaldía municipal para obtener información acerca de lo que hacen y qué cosas no aceptan para el reciclaje. La alcaldía publica folletos y panfletos frecuentemente y los manda directamente a las casas por correo. Pida a los estudiantes que observen la cantidad de bolsas de basura que su familia saca afuera cada día o si no están reciclando actualmente. Pida a los estudiantes que piensen en un plan de reciclaje para sus familias. (¿Cómo se va a organizar y preparar la basura para el reciclaje, donde se va a colocar en la casa, etc.?). Después de que reciclen por una o dos semanas, pida a los alumnos que hagan una cuenta de la cantidad de basura que vota la familia ahora que reciclan. En las ciudades donde no reciclan, o sólo aceptan papel periódico, vidrio o plástico para el reciclaje, hay compañias que generalmente reciclan otros materiales de la casa (sobres sin ventanas de plástico, papel de color, plásticos que no sean de categoría número "2" y "6") por un pequeño pago mensual.

Lesson 45

What Have We Learned?
¿Qué hemos aprendido?



Overview

In this final lesson, students work in cooperative learning teams at work stations to review the concepts and vocabulary introduced in the unit.

Resumen

En esta lección final los alumnos trabajan en sus equipos de aprendizaje cooperativo en centros de trabajo para repasar los conceptos y el vocabulario presentados en la unidad.

Key Skills

Problem-solving

Recording

Reporting

Writing

Working cooperatively

Destrezas claves

Resolver problemas

Llevar un registro

Reportar

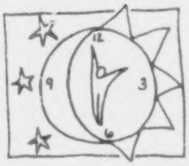
Redactar

Trabajar cooperativamente

Preplanning

1. Make copies of Handout 45.1.
2. Determine which word game students will play at Work Station I. Prepare as necessary. Place each group's word bank, pencils, and blank word cards at this work station.
3. Prepare the index cards with one of the five basic essentials elements (food, water, air, shelter and space) written on each one. Place them at Work Station II.

4. Collect wooden sticks (or branches from the great outdoors) for Work Station III, along with plain paper for the inside pages of the book, sturdy sheets of handmade paper for the cover that have been, preferably, laminated together (use those made in the work station in Lesson 31) as well as hole punchers.
5. Review your procedures and rules for work stations with the teaching assistants, assign teaching assistants to work stations, and make sure each knows his/her responsibilities.



Suggested Time

10 minutes — Welcoming
45 minutes — Homework/Learning Options
20 minutes — Work Station I: Wordbanks and Vocabulary Games
20 minutes — Work Station II: Saving Resources
20 minutes — Work Station III: *Nuestro mundo creativo*
5 minutes — Closing

2 hours total

Materials

A teacher and teaching assistants are needed to fully implement this lesson. You will need the following materials:

Work Station I:

- Handout 45.1, "Unit Review of Vocabulary."
- Blank 3" x 5" index cards for wordbanks.

Work Station II:

- Five index cards with one of the following words written on each: "water," "air," "shelter," "space," or "food."
- Chart paper and markers.
- Paper and pencils (one for each student).

Work Station III:

- Rubber bands, 2½"-3" long (one per student).
- 4" - 5" wooden sticks or branches (one per student).
- Plain paper for inside pages of book (inside pages can be handmade, though students would have probably not made enough sheets in Lesson 31 to make this possible).
- Two sheets of handmade paper (that have preferably been laminated) per student, from sheet papermaking project in Lesson 31.
- Hole punch (two per cooperative learning group at work station).
- Make copies of Handout 45.2 (one per student).

Suggested Quote/Cita sugerida

I hope you will go out and let stories happen to you, and that you will work them, water them with your blood and tears and your laughter till they bloom, till you yourself burst into bloom. Then you will see what medicine they make, and where and when to apply them.

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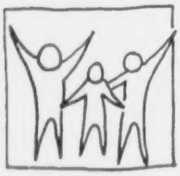
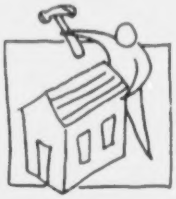
SESSION PLAN



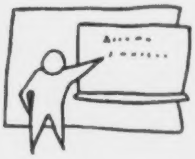
Welcoming (10 minutes)

Welcome students and take attendance. Tell them that they will be working at work stations today. Review work station procedures with the class, if necessary.



Homework/Learning Options (45 minutes)

Students should use this time to complete homework assignments, receive individualized tutoring, or engage in free reading.



Curriculum

Work Stations (20 minutes at each)

Work Station I: Wordbanks and Word Games

A teaching assistant should staff this station, if possible. Teams will use their word banks and the list of key vocabulary, Handout 45.1, as a reference. Provide students working at this work station with a few minutes to review the words that have been introduced in the unit and to determine, as a group, which words should be added to their team wordbank.

After students have reviewed the vocabulary introduced in the unit, provide them with an opportunity to reinforce their new knowledge through a word game. Review the procedures for the various word games suggested in Lesson 24 ("Toss-A-Question," "Send-A-Problem," or "Turn-4-Review"). Use one of these suggested word games, or one of your own.

Centro de trabajo 1: Banco de palabras y Juego de palabras

Un asistante de maestro debe ser el que diriga este centro de trabajo si es posible. Los grupos usarán sus bancos de palabras y la lista del vocabulario clave; puede usar tambien la Hoja de trabajo 45.1 como referencia. Déle unos minutos a los estudiantes que están trabajando en este centro de trabajo para que repasen las palabras que fueron presentadas en la unidad y para que determinen qué palabras deben añadirse a su banco.

Después que los estudiantes repasen el vocabulario presentado en la unidad, déle la oportunidad de reforzar sus conocimientos por medio del juego de palabras. Revise las reglas de los juegos de palabras sugeridos en la Lección 24 ("Haga una pregunta", "Envie un problema" o "De la vuelta para el repaso"). Use uno de estos juegos de palabras sugeridos o su propio juego.

Work Station II: Saving Resources

A teaching assistant should staff this work station. At this station, students may further investigate how they are connected to their environment — how their behavior and activities affect the world they live in.

One student in each team will choose one of the five index cards, which should be placed face down in the center of this work station. Have this team member read his/her card aloud. Tell the team working at this station that they will be focusing on this one basic essential element while they are at Work Station II. The team's task is to provide a list of activities which they can perform at home, at school, and at Academia to help protect or conserve this essential resource. For example, if the team chooses water, the team may list some of the following activities to protect this essential element: treat water before it is returned to the watershed, turn water off while brushing teeth, take short showers or baths, etc. Students should use the markers and chart paper provided to create their list, and post these activities in the room to share with the other teams.

Centro de trabajo 2: Cuidando recursos

Un asistente de maestro debe ser el que diriga este centro de trabajo. En este centro de trabajo los estudiantes investigarán más acerca la conección que tienen ellos con el medio ambiente — cómo su comportamiento y actividades afectan al mundo en que viven. Un estudiante por grupo va a escoger una ficha de entre las cinco fichas, la cual debe colocarse boca abajo en el medio de este centro de trabajo. Pida al miembro del grupo que lea su ficha en voz alta. Diga al grupo que van a trabajar en este centro de trabajo enfocandose en este elemento básico y fundamental. El trabajo del grupo es el proveer una lista de actividades que van a hacer en casa y en Academia para ayudar a proteger o preservar este recurso vital. Por ejemplo, si el grupo escoge el agua, ellos pueden hacer una lista de las siguientes actividades para proteger este elemento vital: tratar el agua antes de retornar a la vertiente, apagar el agua mientras uno se está cepillando los dientes, tomar baños cortos, etc. Los estudiantes deben hacer sus listas con marcador en el papel grande y colocar estas actividades en el salón para compartir con otros grupos.

Work Station III: *Nuestro mundo creativo*: Handmade Bookmaking

This "Paper Anew Project" is an extension of the *Nuestro mundo creativo* work station in Lesson 31. It is a rather simple activity that produces beautiful results. Students can use this book for keeping Academia mementos, writing, and other things. You might want to plan this project so that its purpose is for students to use the book to do some of the activities outlined in Unit 6. You can tack on additional activities (related to family and personal uniqueness, for example) to this unit. Students can later add them to the book. Have students take the books home both as an Academia keepsake and as a "family facts book" they can add to in the future long after Academia is done.

The page pattern included as Handout 45.2 will yield a finished book size of 5" x 7". Variations can be made by cutting paper to adjust size or putting stick binding on the opposite side.

Model the following steps yourself first, particularly if you have younger students:

1. Cut pages of plain paper to size using the pattern included as Handout 45.2. Punch two holes on one side.
2. Punch holes in handmade paper using the same spacing you used for the pages.
3. Sandwich pages between two pieces of handmade paper, aligning holes.
4. Insert one end of rubber band from bottom through all the layers to the top of the book, forming a loop. Insert one end of the stick or branch through the loop.
5. Insert other end of rubber band, from the bottom through all the layers of paper to the top of the book, forming second loop. Slide other end of stick or branch through rubber band loop, allowing it to constrict and hold the book together.
6. Optional: If there is time, either today or later, a photograph or favorite Academia poem can be added to the cover of the book. A pattern of a favorite animal in danger of extinction, the earth, or an icon to represent one of the essential elements can be cut out in fabric or felt and glued to the cover as well. Don't forget natural materials: leaves can be glued on, as can dried flowers, and other items.

Centro de trabajo 3: Nuestro mundo creativo: Libro hecho a mano

Este proyecto de papel es una extensión del Centro de trabajo de "Nuestro mundo creativo de la Lección 31". Es una actividad simple que produce muy buenos resultados. Los estudiantes pueden usar este libro para mantener memorias de Academia, redacciones y otras cosas. Sería buena idea planear este proyecto con el propósito de que los estudiantes usen el libro para hacer algunas

actividades que se mencionan en la Unidad 6. Usted puede añadirle a esta unidad actividades adicionales (relacionadas a la familia y a la individualidad, por ejemplo). Después, los estudiantes pueden añadir estas al libro. Diga a los estudiantes que se lleven los libros a sus casas como recuerdo de Academia y/o para usarlos cómo "un libro de memorias para la familia", al cual podrían añadirle más cosas en el futuro, aún cuando Academia haya concluído.

El ejemplo que se incluye en la Hoja de trabajo 45.2 va a producir un libro terminado de 5 x 7 pulgadas de ancho. Se pueden hacer variaciones cortando el papel para ajustar el tamaño o poniendo un palo por detrás en el lado opuesto.

Siga los siguientes pasos primero usted para experimentar el modelo, particularmente si tiene alumnos de grados inferiores:

1. Corte hojas de papel simple del tamaño del patrón incluido en la hoja de trabajo 45.2. Haga dos huecos en un lado del papel.
2. Haga dos huecos en el papel hecho a mano usando la misma distancia entre los huecos de las hojas anteriores.
3. Ponga dos hojas de papel simple en medio de las hojas de papel hechas a mano en forma de un sandwich aliniando los huecos.
4. Haga pasar la banda elástica por el hueco de las hojas formando una círculo. Inserte la punta del palo en el círculo.
5. Haga pasar la banda elástica por el otro lado del hueco de las hojas formando un segundo círculo. Haga pasar la otra punta del palo por medio del círculo de elástico para sujetar el libro.
6. Opcional: Si hay tiempo hoy o mañana, pueden añadirle a la portada del libro una fotografía o un poema de Academia. Se puede recortar y pegarse a la portada una fotografía favorita de un animal en peligro de extinsión, o un diseño en tela o fieltro que represente a uno de los elementos de la Tierra. No se olvide de los materiales naturales: se le pueden pegar a la portada hojas, flores secas, etc.

Closing (10 minutes)

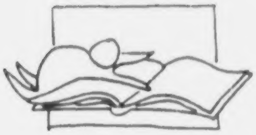
Review the day's activities with students. Ask a volunteer (or the Reporter) from each cooperative learning team to share the work they completed at Work Stations I and III. Praise each group's work and give them time to revel in their sense of accomplishment.

Parent Link

Have individual team members take home copies of the activities list they came up with during Work Station II, review with parents their ideas for saving resources, and ask that parents contribute some ideas of their own.

Enlace familiar

Diga a los alumnos de cada grupo que lleven a su casa la copia de la lista de actividades que ellos hicieron en el Centro de trabajo 2, repase con los padres las ideas que tienen para cuidar los recursos, pida a los padres que contribuyan con algunas de sus propias ideas.



Literature Link

50 Simple Things Kids Can Do To Save the Earth explains how specific things in a child's environment are connected to the rest of the world, how using them affects the planet, and how the individual can develop habits and projects that are environmentally sound. Recommended for grades 4 and up.

Handout 45.1

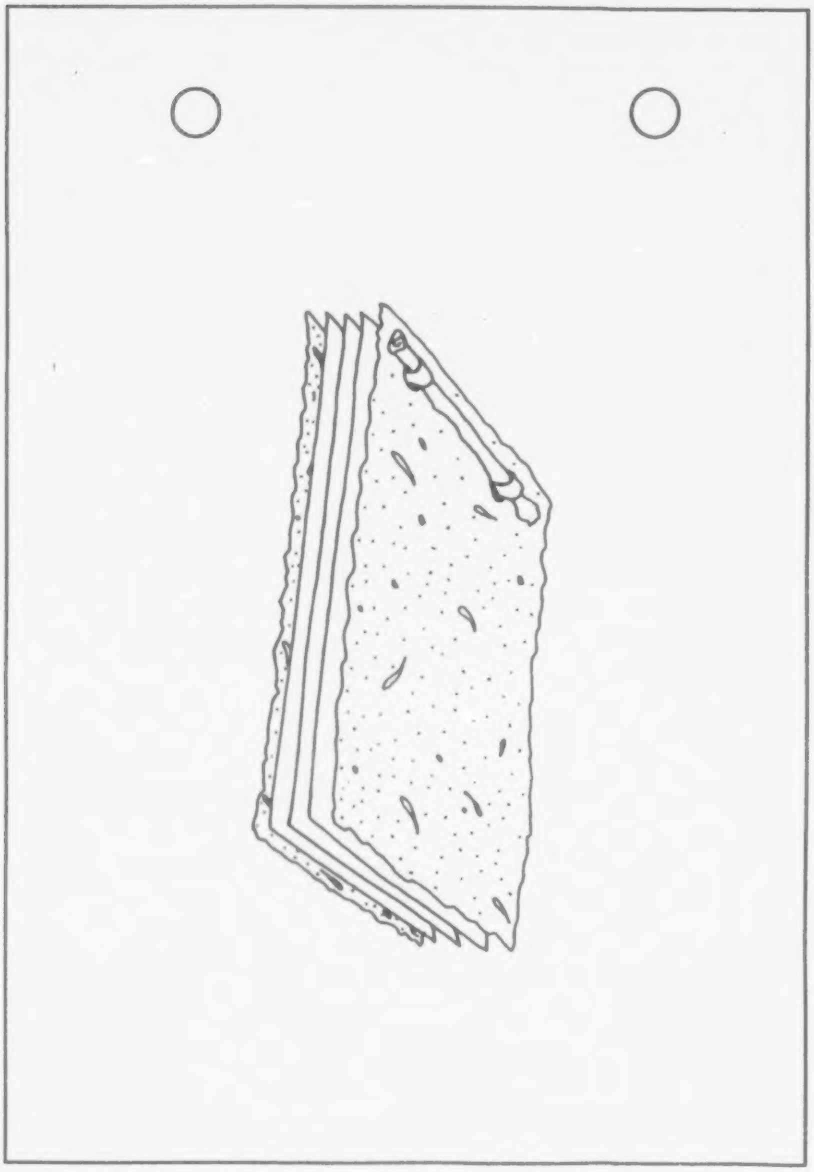
Unit Review of Vocabulary
Repaso de vocabulario

1.	pollution	1.	contaminación
2.	oxygen	2.	oxígeno
3.	nitrogen	3.	nitrógeno
4.	carbon dioxide	4.	anhídrido carbónico
5.	invisible	5.	invisible
6.	fossil fuels	6.	combustibles de fósil
7.	tally	7.	llevar la cuenta
8.	acid rain	8.	lluvia ácida
9.	sulfuric acid	9.	ácido sulfúrico
10.	sulphur dioxide	10.	bióxido sulfúrico
11.	greenhouse effect	11.	efecto de invernadero
12.	global warming	12.	calentamiento global
13.	soil erosion	13.	erosión de la tierra
14.	absorb	14.	absorber
15.	surface	15.	superficie
16.	waste disposal	16.	disposición de desechos
17.	degrade	17.	degradar
18.	landfill	18.	vaciadero de basura

Handout 45.2

Handmade Book Pattern Design
Diseño para un libro hecho a mano

Paper Anew® Project



Unit 6

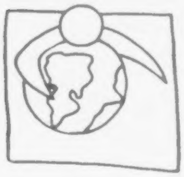
Me and My World
Mi mundo y yo

Introduction

This unit emphasizes students' connection with many of the concepts presented in previous units. What is the student's place in this vast interconnected world they have been studying? This important question is answered through activities that focus on the individual. Students explore their roots and learn about biological and cultural features that distinguish them from others. They also apply their scientific knowledge to begin to understand the common bonds between human beings and animals. The first few lessons in this unit focus on the student's individuality and history. The last few lessons provide them with opportunities to use their "individuality" to come up with solutions to some of the problems raised in previous units.

Introducción

En esta unidad se enfatiza la conección e interacción de los alumnos con muchos de los conceptos que se presentaron en las unidades previas. ¿Cuál es el lugar de los estudiantes en este mundo vasto e interconectado que han estado estudiando? La respuesta a esta pregunta importante se encuentra a través de actividades enfocadas hacia la persona individual. Los alumnos exploran sus raíces y estudian los rasgos biológicos y culturales que los distinguen de los demás. También aplican sus conocimientos científicos para empezar a comprender los lazos comunes entre los seres humanos y los animales. Las primeras lecciones de la unidad se enfocan hacia la individualidad e historia de los alumnos. Las últimas lecciones le presentan oportunidades de aplicar su individualidad al buscar soluciones a algunos de los problemas presentados en las unidades previas.



Overview

Lesson 46: Shoe Clues: Making and Classifying Shoe Prints

In this lesson, students review the concept of individuality, initially introduced in Unit 1, by examining unique physical characteristics. Students are asked to deduce certain characteristics of their classmates based on their shoeprints, and the wealth of information we can extract from these. They make, and classify, their own shoe prints using modeling dough.

Lesson 47: Shoe Clues: Evidence From Tracks

Students continue to investigate the information that can be extracted from a shoe print. They attempt to determine a person's height based on the size of their shoe.

Lesson 48: Can Numbers Describe Me?

Students are provided with an opportunity to explore the use of numbers to describe themselves. They discover a variety of personal facts and figures by counting and measuring.

Lesson 49: The Punnett Game

This lesson provides students with an opportunity to understand why they possess certain characteristics. In an introduction to basic genetics, they explore the concept of hereditary traits.

Lesson 50: What are the Chances?

As an extension to Lesson 48, Lesson 50 focuses on the concept of probability and the role it plays in determining certain inherited traits, such as eye color.

Lesson 51: Learning from History

In this lesson, students discover their own unique history by creating time-lines to record important events in their lives — such as the birth of a brother or sister, starting school, moving to a new city — and important accomplishments — like learning to read, learning to ride a bike, and the like.

Lesson 52: Learning from Artifacts

Students continue to learn about the past by gathering other forms of information — artifacts and stories left by people of long ago. They apply this new knowledge of the past to their understanding of some of the global problems we are faced with today.

Lesson 53: What Have We Learned?

Working in cooperative learning teams, students apply their new understanding of themselves and their world in creating solutions to the problems discussed in previous units. They acknowledge the good work they have done in Academia this year, and how their work has contributed to the well-being of the environment, especially the class recycling project.

Resumen

Lección 46: Zapatos y huellas

En esta lección, los alumnos repasan el concepto de individualidad que se presentó en la Unidad 1, al examinar las características físicas particulares. Se les pide que deduzcan ciertas características de sus compañeros basándose en las

huellas de sus zapatos, y la gran cantidad de información que se puede extraer de estas huellas.

Lección 47: Huellas y pistas

Los alumnos siguen investigando la información que se puede extraer de las huellas. En esta lección, calculan la estatura de una persona basándose en el tamaño de los zapatos.

Lección 48: ¿Me pueden describir los números?

En esta lección los alumnos aprenden cómo pueden utilizar los números para describirse a sí mismos. En el proceso de contar y medir, descubren una variedad de factores personales.

Lección 49: El Juego de Punnett

En esta lección se les presenta a los alumnos la oportunidad de comprender porqué poseen ciertas características. A través de la introducción a las bases de la genética, exploran el concepto de las características hereditarias.

Lección 50: ¿Qué es la probabilidad?

Como extensión a la Lección 3, esta lección se enfoca en el concepto de la probabilidad, y el papel que juega en la determinación de ciertas características hereditarias, como el color de los ojos.

Lección 51: Aprendiendo de la historia

En esta lección, los alumnos descubren su historia particular al crear una cronología para registrar los eventos importantes de sus vidas — el nacimiento de un hermano o hermana, el primer día de escuela, el cambio a una ciudad nueva — o logros importantes, como aprender a leer, aprender a andar en bicicleta, etc.

Lección 52: Aprendiendo de los artefactos

Los alumnos siguen estudiando el pasado al reunir otros tipos de información—artefactos e historias que dejó la gente de antaño. Aplican este nuevo conocimiento del pasado a su comprensión de algunos problemas mundiales que enfrentamos actualmente.

Lección 53: ¿Qué hemos aprendido?

Trabajando en equipos de aprendizaje cooperativo, los alumnos aplican su nueva comprensión de sí mismos y de su mundo, al crear soluciones a los problemas presentados en las unidades previas. Reconocen el buen trabajo que han logrado este año en la Academia, y cómo ha contribuído este trabajo al bien del ambiente, sobre todo el proyecto de reciclaje.

Objectives

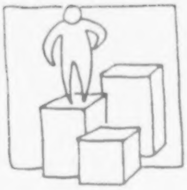
By the end of this unit, students will be able to:

1. Understand basic science vocabulary.
2. Classify by size and shape.
3. Identify their unique characteristics.
4. Write about basic genetic concepts.
5. Identify hereditary traits.
6. Work cooperatively to accomplish a common goal.
7. Create a timeline.
8. Understand that numbers are used to describe individuals.

Objetivos

Al terminar esta unidad, los alumnos podrán:

1. Comprender el vocabulario básico de ciencias.
2. Clasificar por tamaño y forma.
3. Identificar sus características particulares.
4. Escribir acerca de conceptos básicos de genética.
5. Identificar características hereditarias.
6. Trabajar en forma cooperativa para lograr una meta común.
7. Crear una cronología.
8. Comprender que los números se utilizan para describir a individuos.



Operating Grade Level

All the lessons in this unit are appropriate for grades 3-6.

Nivel de grado

Todas las lecciones de esta unidad son apropriadas para los grados 3-6.

Suggested Quote/Cita sugerida

I am new. History made me... I was born at the crossroads and I am whole.

—Aurora Levins Morales as quoted in *The Fire in Our Souls*

Ms. Morales writes poetry, nonfiction, and fiction, has worked in radio and theater, and is the coauthor of *Getting Home Alive*, a collection of poetry and prose, with her mother Rosario Morales.

Yo soy nueva(o). La historia me hizo...Yo nací en una encrucijada y soy completa(o).

—Aurora Levins Morales

The way the Indians say "seeing" is how close you can come to the way things really are, the way a deer sees a rock, or the way a frog sees water; we call that "seeing." Every human being has that seeing in them...

—Jimmy Santiago Baca as quoted in *The Fire in Our Souls*

Mr. Santiago Baca is a playwright, poet, and novelist. His works include *Black Mesa Poems* and the autobiography, *In the Way of the Sun*. In 1989, he was awarded the National Hispanic Heritage Award.

La manera en que los indios dicen "ver" es cuanto se puede uno aproximar a la forma verdadera de las cosas, la forma en que un venado ve una piedra, o la forma en que una rana ve el agua, nosotros llamanos a eso "ver". Todo ser humano tiene esa misma forma de ver.

—Jimmy Santiago Baca

You may want to do the following with the quote:

- Introduce the quote to students.
- Ask students to write it on newsprint and place it in a visible place such as the wall.
- Talk about the author.
- Brainstorm possible meanings and ways in which those meanings apply to the unit and to the lives of students, their families or communities.
- Ask students if the quote reminds them of something their parents, grand- parents or other family members would have said or agreed with.
- Ask students to re-state the quote in their own words (individually or in group).
- Look for opportunities to relate the quote to language arts activities or "Our Creative World" activities in work stations.
- Create a class "quote file" to which students can add quotes from this curriculum and those that their parents, grandparents or other family members may share with them during the course of Academia.
- Ask students and adults to send in favorite sayings or proverbs of friends or family members, lyrics from songs, passages from books, original contri-

butions, that relate to math and science and nature or the environment, or to themes like perseverance, courage, determination, inspiration, identity, uniqueness or diversity.

Usted podría hacer lo siguiente con la cita:

- Introducir la cita a los alumnos.
- Pedir a los alumnos que escriban la cita en un papel de periódico y que lo pongan en un lugar visible como la pared.
- Repasar posibles significados y formas en las que estos significados puedan ser aplicables a la unidad y la vida de los estudiantes, sus familias o comunidades.
- Preguntar a los alumnos si esta cita les recuerda de algo que sus padres, abuelos, u otros familiares les hayan dicho o con lo que estos están de acuerdo.
- Pedir a los alumnos que vuelvan a plantear la cita en sus propias palabras (individualmente o en grupo).
- Buscar oportunidades para relacionar la cita con las actividades de lenguaje o las actividades de "Nuestro mundo creativo" en los centros de trabajo.
- Crear un "archivo de citas" de la clase al que los alumnos puedan añadir citas de este manual, y los padres, abuelos, u otros miembros de la familia puedan compartir con ellos durante el curso de la Academia.
- Pedir a los alumnos y personas adultas que manden sus dichos favoritos o proverbios de sus amigos o familiares, letra de canciones, pasajes de libros, contribuciones originales, que estén relacionados con ciencias o matemáticas, la naturaleza o el medio ambiente, o a temas como perseverancia, valentía, determinación, inspiración, identidad, singularidad o diversidad.

Cultural Link

Lessons 46 and 47 present an opportunity for an interesting cultural link. A discussion about different "paw prints" (footwear marks) humans make in other countries could follow either one, or each of these lessons. For example, in Mexico, footwear has been used differently by different classes of people. The indigenous peoples and the campesinos have traditionally used "huaraches," or sandals. These changed over the years from simple leather soles to rubber-tired soles. Boots, introduced by the Spaniards, were for horsemen, elite soldiers, and ranchers. Modern shoes were reserved for the rich and commercial classes. For many years, in Latin America a person's status could be determined just by looking at their feet.

Enlace cultural

Las Lecciones 46 y 47 presentan una oportunidad para hacer un enlace cultural interesante. Una discusión acerca de las diferentes "huellas" (huellas del calzado) que los seres humanos hacen en otros paises puede seguir a una o todas estas lecciones. Por ejemplo, en México las zapatos se usan de diferente forma por diferentes clases de gente. La gente nativa y los campesinos han usado tradicionalmente los "huaraches" o sandalias (también chancletas o abuelitas). Estos han cambiado con el curso de los años de suelas simples de cuero a suelas hechas de goma de las llantas de automóviles. Las botas que fueron introducidas por los españoles las usaban solamente los jinetes, los soldados de alto rango y los rancheros. Por muchos años, en Latino América se podía determinar el estatus de la persona por medio de sólo mirarle los pies.

Parent Link Summary

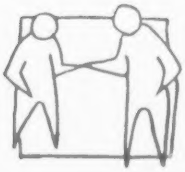
This unit's Parent Links involve families in discussions and activities related to genealogy, physical traits and personal statistics.

Encourage students to write, draw or talk about what they learned from their parents in the previous lesson's Parent Link during the Daily Homework/ Learning Option. Whenever possible, collect students' writing, drawings or projects to share at the PAP meetings, to display on a bulletin board at the end of the unit, or to be acknowledged in other ways.

Resumen de enlaces familiares

Los enlaces familiares de esta unidad involucran a las familias en charlas y actividades relacionadas con con la genealogía, características físicas y datos

Incentive a los estudiantes a que escriban, dibujen o hablen acerca de lo que aprendieron de sus padres en los enlaces familiares de las lecciones previas durante la opción de tarea para la casa. Siempre que sea posible, colecte las notas, dibujos o proyectos de los estudiantes para compartir en la reunión de padres, para exhibirlos en el tablero informativo al terminar la unidad o para reconocerlos de otras maneras.



Parents as Partners Link

This PAP session introduces Academia parents to the culminating unit of the ADP-MAS curriculum. The unit emphasizes the connections and interactions of ideas learned in previous units. The most important element of this unit is that it celebrates the uniqueness of the student and the special role s/he plays in the world.

During this session, parents have the opportunity to review what they have learned themselves during the PAP component of Academia. A discussion to determine whether or not parents felt PAP sessions better prepared them to help their children can follow this last unit's overview.

The PAP coordinator can focus on the importance of what the parents have done for their children. We must highlight that, as individuals, we can impact the lives of many people and the world in which we live. And more importantly, as parents we also impact the development of our children and their world.

To impress upon parents the idea of uniqueness, and the relationship between parents and their children, you can demonstrate Lessons 46 and 47: "Shoe Clues." This lesson requires participants to make imprints of their shoes. The prints are then randomly scattered about the room. Participants then investigate each other's shoeprints and try to determine who made what imprint. Children particularly like this activity and are very adept at finding their parents' shoeprints. This activity is fun, energizing, and will lighten up the session.

Another topic for this session could be showing parents how a strong science and math program can help students. The wonderful occupational opportunities that are open to their children could be a great topic to explore. This session also presents a wonderful opportunity to identify a woman whose career was heavily influenced by the study of math and science. A female doctor , chemist or engineer could discuss what it took to learn her specialty, and the specific obstacles she had to overcome.

The PAP Coordinator can also introduce the ideas proposed in Project PRISM'S handout, "Science and Math Are for Girls." Among the topics covered in this handout is the peer pressure NOT to do well in science and math that girls are put under. In many classrooms, girls also don't get their fair share of hands-on experience. The handout also gives parents suggestions to help their daughters succeed. Young girls need encouragement from all sectors of their communities to help them succeed in science and math. They must be encouraged and supported to study these important disciplines.

Suggested resources for this meeting are:

- Unit 6: "Me and My World," copies of overview and unit objectives.
- Lesson 46 and Lesson 47: "Shoe Clues."
- Guest: female doctor, chemist or engineer.
- Project PRISM handout, "Science and Math Are for Girls."

Reunión de padres

Esta sesión de la reunión de padres introduce a los padres de la Academia la última unidad del programa de estudios de ADP-MAS. Esta unidad enfatiza las conecciones e interacciones de las ideas que se han aprendido en las unidades previas. El elemento más importante de esta unidad es la celebración de la singularidad del estudiante y el papel especial que él o ella juega en el mundo.

Durante esta sesión los padres tienen la oportunidad de repasar lo que han aprendido en la reunión de padres de la Academia. A este último resumen de la unidad le puede seguir una discusión para determinar si la reunión de padres ha preparado mejor a estos para ayudarle a sus hijos.

El coordinador de la reunión de padres puede hacer hincapié de qué cosas importantes los padres han hecho para ayudar a sus hijos. Se debe reconocer que como individuos podemos impactar la vida de mucha gente y del mundo en el que vivimos. Lo más importante es que como padres nosotros impactamos el desarrollo de nuestros niños y su mundo.

Para impresionar a los padres con la idea de la singularidad y la relación entre padres e hijos puede demostrar la "pista de los zapatos" de las Lecciones 46 y 47. Esta lección requiere que los participantes hagan huellas impresas de sus zapatos. Después, las huellas son dispersadas al azar en el salón de clases. Luego de esto los participantes investigan sus zapatos y tratan de determinar a quién le pertenecen las huellas. A los niños particularmente les gusta esta actividad y son expertos en encontrar los zapatos de sus padres. Esta actividad es muy divertida y estimulante y va a alegrar esta sesión.

Otro enfoque de esta sesión puede ser el mostrale a los padres como un buen programa de ciencias y matemáticas puede ayudar a los estudiantes. También sería muy interesante hablar sobre las oportunidades ocupacionales que estan abiertas para los niños. Esta sesión también presenta la oportunidad de identificar la carrera de una mujer que fue influenciada fuertemente por el estudio de las ciencias y las matemáticas. Una doctora, químico o ingeniera puede hablar acerca de lo que se necesita para obtener la especialidad y los obstáculos específicos que tuvo que superar para lograrlo.

El coordinador también puede introducir las ideas propuestas en las hojas de trabajo del projecto PRISM, "La ciencia y las matemáticas son para las niñas". Entre los temas que se cubren en esta hoja de trabajo está la presión que se les pone a las niñas de que ellas NO son buenas en esta materia. En muchas clases a las niñas no se le permite participar de igual manera que a los niños en algunas experiencias prácticas. La hoja de trabajo también ofrece sugerencias a los padres para ayudar a sus hijas a triunfar. Las niñas pequeñas necesitan el apoyo de todos los sectores de su comunidad para ayudarlas a tener éxito en las ciencias y las matemáticas. Se les debe incentivar y apoyar para que ellas estudien estas materias importantes.

Los siguientes recursos se sugieren para esta reunión:

- ☆ Unidad 6: "Yo y mi mundo"; copias del resumen y los objetivos de la unidad.
- ☆ Lecciones 46 y 47: "Pistas del Zapato".
- ☆ Invitados: Una doctora, químico o ingeniera.
- ☆ Hojas de trabajo del proyecto PRISM, "La ciencia y las matemáticas son para los niñas".

Lesson 46

Shoe Clues: Making and Classifying Shoe Prints
Zapatos y huellas

Overview

In this lesson, students review the concept of individuality initially introduced in Unit 1, by examining unique physical characteristics. Students are asked to deduce certain characteristics of their classmates based on their shoeprints and the wealth of information we can extract from these prints. They make and classify their own shoeprints using modeling dough. The activities in this lesson and in Lesson 47 were developed by the National Science Foundation for National Science and Technology Week.

Resumen

En esta lección, los alumnos repasan el concepto de individualidad que se presentó en la Unidad 1, al examinar las características físicas particulares. Se les pide que deduzcan ciertas características de sus compañeros basándose en las huellas de sus zapatos, y la gran cantidad de información que se puede extraer de estas huellas. Hacen y clasifican sus propias huellas con masa de modelar. Las actividades de esta lección y la siguiente fueron desarrolladas por el National Science Foundation para la Semana Nacional de Ciencia y Tecnología.

Key Skills

Observing

Measuring

Predicting

Classifying

Destrezas claves

Observar

Medir

Hacer predicciones

Clasificar

Preplanning

1. Buy Play Doh™ or prepare footprint dough using the recipe that appears under the "Materials" section.
2. Read "Background for the Teacher."

Background for the Teacher

Footprints can yield a wealth of information about an animal or person. For example, scientists studying fossilized dinosaur tracks can learn more than just the shape and size of a dinosaur's feet, or how many toes it had. They can determine the number of feet they walked on by the number of prints they left. Some estimate of the animal's weight and total size can be made by looking at the size of the footprint and the depth of the impression. Bigger animals tend to have bigger feet, and heavier animals make deeper impressions. Is this also true for humans?

The function of an animal's foot can often be determined by the shape of the foot. Animals like the cougar or tiger have paw prints with claws that aid in the killing and eating of other animals. Animals like the horse and elephant have large flat prints that show they must spend long periods standing or moving over large distances.

Human footprints also can reveal much information about the person who made them. Detectives looking at shoeprints can often determine a person's weight, how he or she walks, and whether or not s/he was carrying anything when the shoeprint was made.

Información para el/la maestro/a:

Las huellas de los pies pueden proporcionar mucha información sobre un animal o una persona.

Por ejemplo, al estudiar las huellas fosilisadas de las pisadas de los dinosaurios, los científicos pueden descubrir más que la forma y el tamaño de las patas de un dinosaurio, o cuántos dedos tenía. Pueden determinar con cuántas patas caminaban por la cantidad de huellas que dejaron. Por el tamaño de la pisada y la profundidad de la impresión pueden calcular el peso y el tamaño total del animal. Los animales más grandes tienden a tener patas más grandes, y los animales más pesados dejan impresiones más profundas. ¿Esto será cierto también para los seres humanos?

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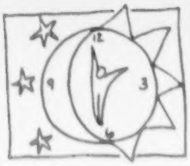
3. Review the following vocabulary:

* *characteristics*	* *características*



Suggested Time

10 minutes — Welcoming
45 minutes — Homework/Learning Options
10 minutes — Guided Discussion
30 minutes — Making Shoe Prints
15 minutes — Whose Shoe?
10 minutes — Closing

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2 hours total

Materials

A teacher can conduct this lesson alone, if necessary. Materials needed for each student include:

- Ball of commercial or homemade modeling dough (recipe follows).
- Piece of 8" x 10" cardboard.
- Piece of 8" x 10" waxed paper.
- Chart paper and markers.

Recipe for Footprint Dough:

10 cups of flour.
5 cups of salt.
10 cups of water.
20 tablespoons of salad oil.
20 teaspoons of cream of tartar.
10 - 15 drops of food coloring (optional).
Large pot or Dutch oven.

1. Mix ingredients in a large pot or Dutch oven. Stir in food coloring to obtain desired color. Place pot on top of stove. Cook and stir ingredients over medium heat until dough has thickened.
2. Remove from stove and pour dough onto washable flat surface. As soon as the dough is cool enough to handle, knead out any large lumps. The dough will remain pliable for many weeks, especially if stored in a plastic bag in the refrigerator. If the dough becomes sticky, knead in additional flour.

(Recipe makes enough for a class of approximately 30 students.)

Suggested Quote/Cita sugerida

I am new. History made me... I was born at the crossroads and I am whole.

—Aurora Levins Morales as quoted in *The Fire in Our Souls*

Ms. Morales writes poetry, nonfiction, and fiction, has worked in radio and theater, and is the coauthor of *Getting Home Alive*, a collection of poetry and prose, with her mother Rosario Morales.

Yo soy nueva(o). La historia me hizo...Yo nací en una encrucijada y soy completa(o).

—Aurora Levins Morales

The way the Indians say "seeing" is how close you can come to the way things really are, the way a deer sees a rock, or the way a frog sees water; we call that "seeing." Every human being has that seeing in them...

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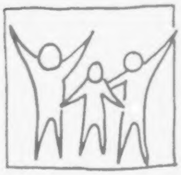
Mr. Santiago Baca is a playwright, poet, and novelist. His works include *Black Mesa Poems* and the autobiography, *In the Way of the Sun*. In 1989, he was awarded the National Hispanic Heritage Award.

La manera en que los indios dicen "ver" es cuanto se puede uno aproximar a la forma verdadera de las cosas, la forma en que un venado ve una piedra, o la forma en que una rana ve el agua, nosotros llamanos a eso "ver". Todo ser humano tiene esa misma forma de ver.

—Jimmy Santiago Baca

SESSION PLAN



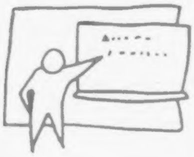
Welcoming (10 minutes)

Welcome students and take attendance. Select a student volunteer from each cooperative learning team to chart their team's recycling contributions. Select a student to chart the class' recycling contributions.

Tell students that in this unit, they will move away from the big world they have been studying (animals, watersheds, and ecosystems) and look at the little world they are each a part of. Tell them that they will begin to look at who they are, why they are who they are, and finally, the role they play in the larger world or community.

Homework/Learning Options (45 minutes)

Students should use this time to complete any homework assignments, do free reading, or receive individualized tutoring.



Curriculum

Guided Discussion (10 minutes)

Begin this discussion by asking students if they have ever wondered why they look the way they do, or why no two people look exactly the same (with the exception of identical twins).

Ask students the following:

"What makes us all different from one another? [We all look different, we all have different histories, etc.] Can you think of a way to tell us apart from one another, other than how we look? [Detectives use several ways, such as finger printing and blood samples. No two people have the same fingerprint, and scientists who work in labs can study our blood to determine how it is different from that of other people's. Another way to tell people and animals apart is by their footprints.]"

"Have you ever made footprints in the sand, mud, or snow? Have you ever seen footprints made by other people? What do you think these footprints tell us about the people who made them? When scientists find fossilized footprints of dinosaurs, they can tell a great deal about the creature that made them just by the number, depth, and other characteristics of the footprints. Have you ever seen animal tracks? Could you identify the animal that made them? In today's lesson, we will try to discover what we can tell from shoeprints made by all of us in this class."

Pregúnte a los alumnos:

"En que nos distinguimos cada uno de nosotros de todos los demás? [Nos vemos diferentes, todos tenemos una historia diferente, etc.] Además de vernos diferentes, ¿pueden pensar en otra manera de distinguir a una persona de todos las demás? Los detectives usan varias maneras, por ejemplo, las huellas digitales y las muestras de sangre. No hay dos personas que tengan las mismas huellas digitales, y los científicos que trabajan en los laboratorios estudian una muestra de sangre para distinguir a una persona de otra. Otra manera de distinguir personas y animales es por sus huellas".

"¿Alguna vez han hecho huellas en la arena, el lodo o la nieve? ¿Han visto huellas hechas por otras personas? ¿Qué creen que estas huellas nos dicen acerca de las personas que las hicieron? Cuando los científicos descubren huellas fósiles de dinosaurio, pueden aprender mucho acerca del animal que las hizo, sólo por el tamaño, la profundidad, y otros aspectos de la huella. ¿Han visto huellas hechas por animales? ¿Podrían decir qué animal las hizo? Vamos a descubrir qué podemos aprender de las huellas hechas por todos nosotros".

Making Shoeprints (35 minutes)

During this activity, students will be making shoeprints and gathering information about the shoes and the people who wear them.

Tell students that, before they begin to make their shoeprints, they will need to write their name on the back of their cardboard. Ask them to flatten a ball of Play Doh™ or footprint dough into a circle slightly larger than the sole of their shoe, on the piece of cardboard. Then, they should place a piece of waxed paper over the flattened dough. After that, ask them to step on the waxed paper to make a shoeprint in the dough. After they step away, have them remove the wax paper.

Dígale a los alumnos:

"Antes de empezar a hacer sus huellas, apunten su nombre en el reverso de su cartón. Pongan una bolita de masa sobre el cartón y aplánenla para hacer un círculo un poco más grande que la suela de sus zapatos. Luego pongan una pieza de papel encerado sobre la masa. Ahora pisen el papel encerado para dejar una huella en la masa. Después de retirar su pie, quiten el papel encerado".

Have students compare shoeprints. Afterwards, begin a discussion about the different ****characteristics*** that each shoeprint has. These characteristics include the type of sole, the width of the shoe, the width of the heel, the length of the shoe, etc. After the discussion, instruct the whole class to line up the shoeprints across a counter, or along the floor, in order of size (length). Give

them a a couple of minutes to complete this assignment. After they have successfully lined up the shoeprints according to size, divide the class into teams of about eight or so. (You may decide to group cooperative learning teams together.) Divide the shoeprints among the teams evenly. (It doesn't matter if students don't have their own shoeprints in their group.) Explain that each team is going to group their shoeprints according to certain recognizable **characteristics*.

Explain the following:

"Each group will choose two or three **characteristics* by which they will separate the shoeprints. Just like detectives, they will try to learn about the people who made those shoeprints. Ask students to discuss within their group what studying these shoeprints could tell us. What information can they gather from these shoeprints? Each group should choose someone to write down on the chart paper the two or three characteristics they used to categorize the shoeprints. Each group will share this information with the rest of the class during the closing session."

Explique a los alumnos:

"Cada grupo va a escoger dos o tres **caracteristicas* que usarán para separar las huellas. Igual que los detectives, van a tratar de aprender algo acerca de las personas que hicieron las huellas. Discutan en su grupo lo que nos pueden revelar las huellas al estudiarlas. ¿Qué información pueden juntar de estas huellas? Cada grupo debe escoger a alguien para anotar en el papel las características que usaron para separar los zapatos. Cada grupo va a compartir esta información al terminar la lección".

Remind students that the task here is to identify **characteristics* (for example, prints made by a shoe with a heel and prints made by an athletic shoe). The task is not to identify who made the print.

Whose Shoe? (10 minutes)

Conclude the previous activity by piling all of the shoes the students used to make their shoe prints on one side of the room. Mix the shoes and have each student choose a shoe from the pile and try to find its matching shoe print. Tell students they only have three minutes to find the shoeprint.

After students have found the matching shoeprint, allow students some time to retrieve their shoes, and sit down. Ask them how they were able to determine which shoeprint belonged to which shoe. Emphasize the fact that each shoe had certain distinguishing **characteristics* that helped you to identify the print.

Closure (10 minutes)

Have each group post the characteristics they used to classify their shoeprints somewhere in the class so that everyone can see them. Allow students time to recognize the way in which other groups chose to classify their shoeprints. Tell students to take home their shoeprints. Warn students that the materials they used to make the prints can clog drains because they do not dissolve. The best way to dispose of the shoeprints is to throw them in the trash.

Parent Link

Students' mothers or fathers and other relatives can be very helpful in this exercise by making the play dough for this project. The footprint dough recipe and production methods are very similar to flour tortilla-making.

Enlace familiar

Las madres o los padres de los estudiantes pueden ayudar en este ejercicio haciendo la plastilina para este proyecto. La receta y el método para hacer la plastilina son muy similares a cómo se hacen las tortillas de harina.

Lesson 47

Shoe Clues: Evidence From Tracks
Huellas y pistas

Overview

Students continue to investigate the information that can be extracted from a shoeprint, and make determinations about a person's height based on the size of their shoe.

Resumen

Los alumnos siguen investigando la información que se puede extraer de las huellas. En esta lección, calculan la estatura de una persona basándose en el tamaño de los zapatos.

Key Skills

Graphing

Predicting

Inferring

Creating

Writing

Destrezas claves

Hacer gráficas

Hacer predicciones

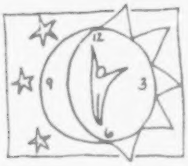
Hacer inferencias

Crear

Redactar

Preplanning

1. Make a large graph on a ten-foot piece of butcher paper. Label the horizontal axis "Height of Person," and the vertical axis, "Length of Shoe." Display the graph in an area that is easily accessible to all students.
2. Review the "Background for the Teacher" provided in Lesson 46.



Suggested Time

10 minutes — Welcoming
45 minutes — Homework/Learning Options
25 minutes — Student Shoe Clues
15 minutes — Journal
15 minutes — Debriefing
10 minutes — Closing

2 hours total

Materials

A teacher can conduct this lesson alone, if necessary. However, teaching assistants can be helpful in assisting with the creation of the Shoe Clue Graph. The following materials are needed:

- Large sheets of butcher paper and markers.
- 24" string or the same length of adding machine tape (per student).
- Scissors (one for each pair of students).
- Glue or tape.
- Handout 47.1, "Footprints."
- Student journals and writing materials.

Suggested Quote/Cita sugerida

I am new. History made me... I was born at the crossroads and I am whole.

—Aurora Levins Morales as quoted in *The Fire in Our Souls*

Ms. Morales writes poetry, nonfiction, and fiction, has worked in radio and theater, and is the coauthor of *Getting Home Alive*, a collection of poetry and prose, with her mother Rosario Morales.

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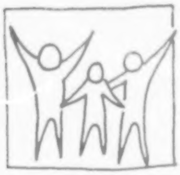
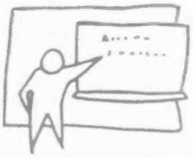


Welcoming (10 minutes)

Welcome students and take attendance. Have a student volunteer recap the activity from the last lesson. Tell students that today they will continue their work as detectives, and try to uncover more information about people from the shoes they wear.

Homework/Learning Options (45 minutes)

Students should use this time to complete homework assignments, do free reading, or receive individualized tutoring.



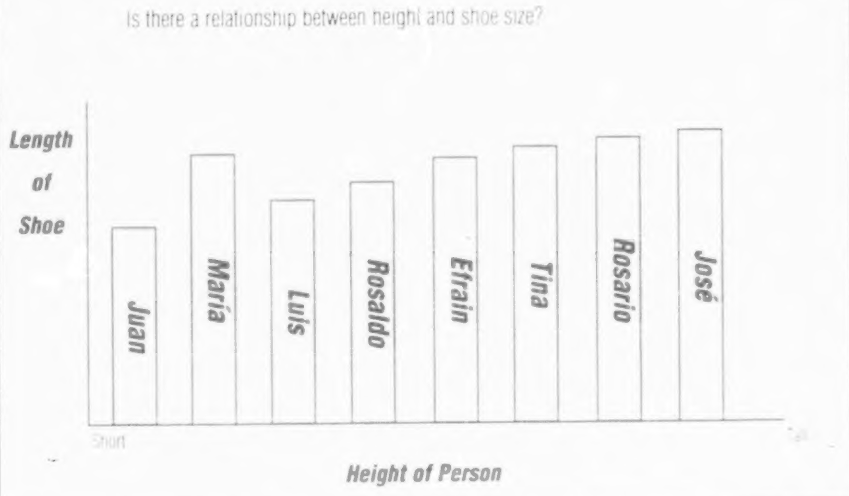
Curriculum

Student Shoe Clues (30 minutes)

Instruct students to pair up. Distribute string or adding machine tape, and scissors to each pair. Remind students to work carefully with scissors. Working together, have students measure and cut a length of string (or adding machine tape) the length of one shoe. While one student is standing on the tape or string, his/her partner can assist by marking the length of the shoe. If students are using the adding machine tape, instruct them to write their name on the paper.

After every student has cut the string or adding machine tape to the length of their shoe, instruct them to line up in order of height from shortest to tallest, with their piece of string in hand. One by one, allow each student to take the piece of string or adding machine tape, and tape (or glue) it to the graph you have prepared. The first student (or shortest student), should tape or glue his/her piece closest to the origin (lengthwise, lined up to the vertical axis). The second student should place his/her string right next to the first student's, and so on. Have students glue or tape the adding machine tape with their names displayed. If they are using string rather than adding machine tape, have each student write his/her name either on the graph, below the horizontal axis, or directly below the place where they have taped their piece of string. Figure 1 illustrates how the graph may end up looking. You may want to draw a line connecting the tops of these strings. The line will probably curve up and down, but will show an upward trend.

Figure 1



Demonstrate to students how the graph can be read, and discuss the final results of the graph by asking the following: "Is there a relationship between a person's height and shoe size? Does a larger shoe size mean a person is taller?"

Pregúnte a los alumnos:

"¿Hay alguna relación entre la estatura de una persona y el tamaño de su zapato? ¿Si el tamaño del zapato de una persona es grande, significa esto que la persona es más alta?"

Debriefing (15 minutes)

Discuss with students how personal **characteristics* are evident in many things (fingerprints, teethmarks, etc.), including a shoeprint. In order to initiate a discussion, tell students the following:

"Many times we can determine where certain animals live by identifying their footprints on the ground. People can also learn about the size of the animal, and how they walk or run. For example, beavers have webbed hind feet to swim, and front feet shaped like human hands to grab wood. The prints of deer show flat hooves because they walk long distances. Seals drag themselves on the ground using their flippers, leaving a large print with a wing shape. Leopard frogs have two small front feet, that they heave back for traction, and large back feet to jump. When we look at the prints made by people, we notice that people wear different kinds of shoes. We can tell what the weather is like based on shoe prints. Do many people wear sandals in the winter? Do many people wear boots to the beach? Just like animals have feet adapted for the activities they do, people wear shoes adapted to the activities they do."

Diga a los alumnos:

"Muchas veces podemos determinar dónde vive cierto animal al identificar las huellas que deja en la tierra. También podemos deducir de qué tamaño es, y cómo camina o corre. Por ejemplo, las patas traseras de los castores son palmeadas para nadar, las delanteras parecen manos, para agarrar madera. Las huellas de venado demuestran que tienen pezuñas planas para caminar distancias largas. Las focas se arrastran por la tierra con sus aletas, dejando una huella larga en forma de ala. Los sapos leopardo tienen dos pequeñas patas delanteras que retraen para apoyarse, y grandes patas traseras para brincar. Cuando nos fijamos en las huellas de las personas, notamos que usan diferentes tipos de zapatos. Podemos adivinar qué tiempo hace al observar las huellas de los zapatos. ¿Hay muchas personas que usan sandalias en el invierno? ¿Hay muchas personas que usan botas en la playa? Así como los animales tienen patas adaptadas para ciertas funciones, los seres humanos usan zapatos adaptados para distintas actividades".

Distribute Handout 47.1 to students to complete. This may provide them with ideas to begin their journal entry. If they do not have time to complete the handout, let them complete it at home, or at Academia, after they have done their homework.

Journal (15 minutes)

Tell students to draw an imaginary footprint, and then describe the animal, person or extraterrestrial creature that made that print. They should explain how their descriptions are based on the print, and how the print is suited for the animal's environment and function. (This is a good opportunity for students to begin using the book they made by hand in the last unit.)

Diga a los alumnos:

Cada uno de ustedes va a dibujar una huella imaginaria y luego va a describir qué animal, persona o criatura extraterrestre la hizo. Deben explicar cómo la descripción está basada en la huella, y cómo la huella está adaptada al medio ambiente y la función del animal.

Closing (10 minutes)

Ask a few volunteers to share their journal entries and drawings of imaginary footprints. Thank students for their good work, and tell them that, in the next few lessons, they will continue to learn why individuals have different characteristics.

Parent Link

What are the foot characteristics of students' families? Ask students to conduct a short survey of their family members' feet. What size of shoe do males in the family wear? What about females? Why are men's and women's shoe sizes different even though they go by the same number system? Are there any family foot traits that have been passed on to this new generation or the previous one? (For example, a middle toe longer than the big toe, flat feet, pidgeon-toed feet, and so forth.)

Enlace familiar

¿Cuáles son las características de los pies de la familia de los estudiantes? Pida a los estudiantes que hagan una encuesta pequeña de los pies de los miembros de la familia. ¿Qué tamaño de zapatos usan los hombres de la familia? ¿Qué tamaño usan las mujeres? ¿Porqué el tamaño de zapato del hombre es diferente al de la mujer aunque sean del mismo número? ¿Existen algunas características fami-liares del pie que se han heredado en la nueva generación o en generaciones pasadas? (Por ejemplo un dedo más largo que el dedo gordo, etc.)

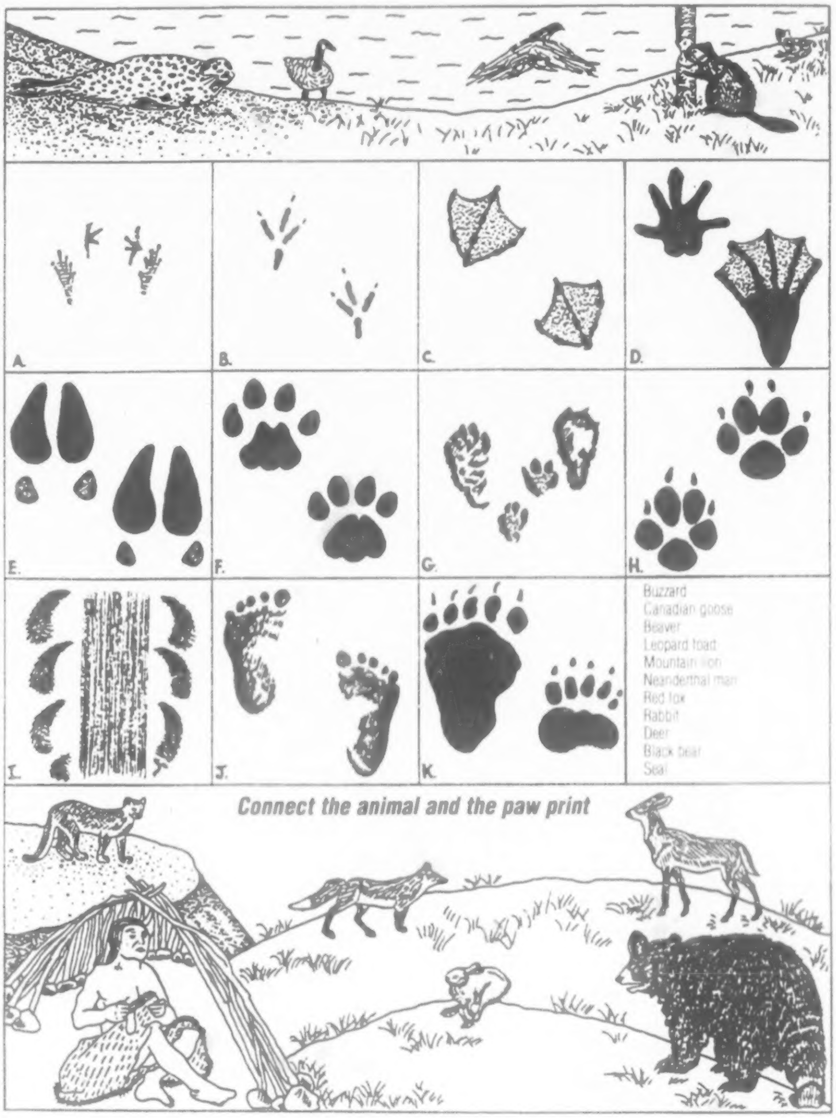
Literature Link

Alligator Shoes, by Arthur Dorros, tells the tale of Alvin Alligator who is accidently locked in a shoe store. After trying on an endless variety of footwear, his preferred shoe comes as a big surprise to readers. Recommended for grades K-2.

574

Handout 47.1

Footprints

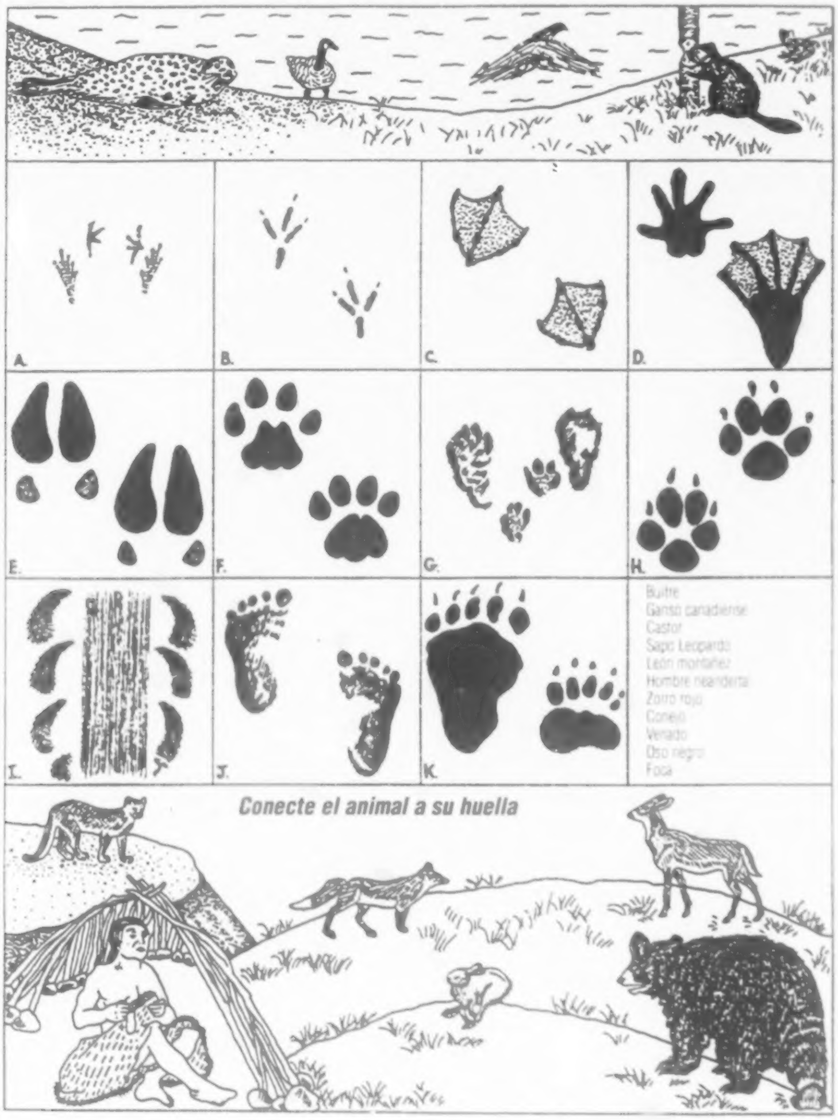


Buzzard
Canadian goose
Beaver
Leopard toad
Mountain lion
Neanderthal man
Red fox
Rabbit
Deer
Black bear
Seal

Connect the animal and the paw print

Hoja de trabajo 47.1

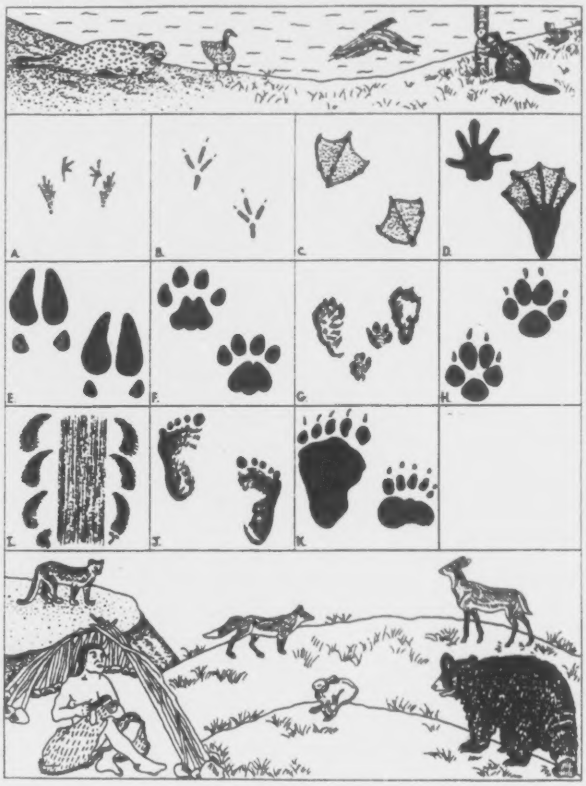
Huellas



Conecte el animal a su huella

Handout 47.1

Footprints/Huellas



A. Leopard Toad/Sapo Leopardo

B. Buzzard/Buitre

C. Canadian Goose/Ganzo Canadiense

D. Beaver/Castor

E. Deer/Venado

F. Seal/Foca

G. Rabbit/Conejo

H. Mountain Lion/León Montañez

I. Red Fox/Zorro Rojo

J. Neanderthal Man/Hombre neandertal

K. Black Bear/Oso negro

Lesson 48

Can Numbers Describe Me?
¿Me pueden describir los números?

Overview

Students are provided with an opportunity to explore how they can use numbers to describe themselves. They discover a variety of personal facts and figures by counting and measuring.

Resumen

En esta lección los alumnos aprenden cómo pueden utilizar los números para describirse a sí mismos. En el proceso de contar y medir, descubren una variedad de factores personales.

Key Skills

Counting

Measuring

Recording

Working cooperatively

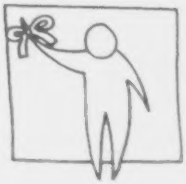
Destrezas claves

Contar

Medir

Llevar registros

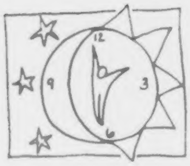
Trabajar en forma cooperativa



Preplanning

1. Make copies of Handout 48.1, "Taking Measurements"
2. Review the following vocabulary:

* *statistics*	* *estadísticas*
* *length*	* *largo*
* *width*	* *ancho*
* *circumference*	* *circunferencia*
* *median*	* *promedio*



Suggested Time

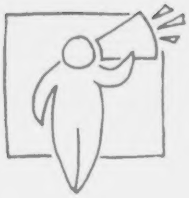
10 minutes — Welcoming
45 minutes — Homework/Learning Options
15 minutes — Guided Discussion
30 minutes — Taking Measurements
10 minutes — Finding the Average
10 minutes — Closing

2 hours total

Materials

A teacher can conduct this lesson alone, if necessary. The following materials will be needed:

- Handout 48.1,"Taking Measurements."
- Measuring tapes (one per pair of students).
- Pens or pencils.



Suggested Quote/Cita sugerida

I am new. History made me... I was born at the crossroads and I am whole.

—Aurora Levins Morales as quoted in *The Fire in Our Souls*

Ms. Morales writes poetry, nonfiction, and fiction, has worked in radio and theater, and is the coauthor of *Getting Home Alive*, a collection of poetry and prose, with her mother Rosario Morales.

Yo soy nueva(o). La historia me hizo...Yo naci en una encrucijada y soy completa(o).

—Aurora Levins Morales

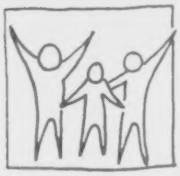
The way the Indians say "seeing" is how close you can come to the way things really are, the way a deer sees a rock, or the way a frog sees water; we call that "seeing." Every human being has that seeing in them...

—Jimmy Santiago Baca as quoted in *The Fire in Our Souls*

Mr. Santiago Baca is a playwright, poet, and novelist. His works include *Black Mesa Poems* and the autobiography, *In the Way of the Sun*. In 1989, he was awarded the National Hispanic Heritage Award.

La manera en que los indios dicen "ver" es cuanto se puede uno aproximar a la forma verdadera de las cosas, la forma en que un venado ve una piedra, o la forma en que una rana ve el agua, nosotros llamanos a eso "ver". Todo ser humano tiene esa misma forma de ver.

—Jimmy Santiago Baca



Welcoming (10 minutes)

Welcome students and take attendance. Provide a few minutes for students to chart their recycling contributions on their team charts. Select a student volunteer to chart the class' contributions on the class recycling chart. Tell students that today they will continue to explore physical characteristics through an exploration of numbers, or personal ****statistics***.

Homework/Learning Options (45 minutes)

Allow students to complete any homework, receive individualized tutoring or engage in free reading during this time. Students can also use this time to add words to their team wordbanks.

Curriculum

Guided Discussion (15 minutes)

Ask students what kind of personal numbers they know about. Allow time for a number of responses, which may include birth dates, addresses, telephone numbers, age, etc. Write these numbers on the board and tell students that these personal numbers, or ****personal statistics***, help describe who they are. Encourage students, who may not have some of these important numbers memorized yet, to ask their parents to share this information with them.

Share the following information:

"Numbers are being used more and more to distinguish us from other people. Everybody has different numbers that help identify them: their address, their telephone number, social security number, their birth date, etc.

Numbers, or ****personal statistics***, have been used to describe you since the moment you were born. When you were born, the doctors measured your length, noted your weight, head size, reflexes, the day, the date, and the time. These numbers are uniquely yours — and yours alone — and were entered in the hospital's records to help in your identification. Height and weight are the first numbers we think of when we think about our ****personal statistics***, but they are not the only ones of importance. If you buy clothes, rings, shoes, hats, you will need to know many other ****personal statistics***. In the next activity, you will be working with a partner to explore some of these measurements."

Explíque a los alumnos:

"Cada vez más, se están usando los números para distinguir a una persona de otra. Cada persona tiene números diferentes que ayudan a identificarla: su dirección, su número de teléfono, su número de seguro social, su fecha de nacimiento, etc."

"Desde su nacimiento, se han usado los números, o las ***estadísticas personales**, para describirlos a ustedes. Cuando nacieron, los médicos apuntaron cuánto medían de largo, cuánto pesaban, el día, la fecha y la hora del nacimiento. Estos números son muy personales — se refieren a una persona y únicamente a esa persona — y fueron registrados por el hospital para ayudarles en su identificación. Cuando pensamos en nuestras ***estadísticas personales**, las primeras que se nos ocurren son la estatura y el peso, pero esas no son las únicas que importan. Para comprar ropa, anillos, zapatos, o sombreros, hay que conocer otras ***estadísticas personales**. En la siguiente actividad, cada uno de ustedes trabajará con un compañero para explorar algunas de estas medidas".

Taking Measure (30 minutes)

Have students work in pairs for this activity. Distribute Handout 48.1 and a pencil to each student. Distribute measuring tape to each group. Tell them that they will be using the measuring tape to find out their ***personal statistics**. The handout tells students what they will be measuring. Instruct partners to help by holding the tape measure, and by making sure that an accurate measurement has been taken. Make sure students take turns measuring the same body part. Each partner should complete the first item on the handout before moving on to number two.

Before students begin this activity, make sure they know how to read measuring tape. Take the required time to teach them this skill. If students are having difficulty, it may be helpful to walk the entire class through the first item on the handout before allowing students to continue their work with a partner.

Optional Activity:

If you are working with young children who may have difficulty using standard measuring tape, try the following idea: instead of using measuring tape, allow students to cut pieces of string that are the same length as whatever they are measuring. Students can then measure the lengths of string, or glue the length of strings to the handout or to another piece of paper, labeling what each piece of string measured. If they do not use the handout to glue their pieces of string, make sure they indicate what they are measuring either by writing or drawing on the paper.

Finding the Average (10 minutes)

Choose one of the measurements students completed on Handout 48.1, and have them figure out the median measurement in the classroom by conducting a "Line-Up." If for example, you choose to find the ***median** measurement of students' arm span, instruct them to line up according to the arm span they recorded on the handout. Students will line up in the order of shortest to longest arm span. After students have lined up according to arm span length, challenge them to find the ***median arm** span or the arm span which is in the middle. One possible way to find the ***median** is by folding the line. Instruct students at one end — those with the longest arm spans, for example — to walk to the other end of the line and face the students at the other extreme, those with the shortest armspans. When they have finished this step, the student with the longest arm span will be standing across from the student with the shortest arm span; the second longest is facing the student with the second shortest arm span, and so on. The two students who are left in the middle, or the one who is left standing without a partner in the middle, has the ***median** arm span. What is the measurement of this ***median** arm span?

Extension Activity

As an extension to this lesson, you can allow students to continue to explore some personal statistics from their classroom. How many times can students bounce a ball? Jump a rope? How long does it take students to walk a specified distance on the playground? To run? How long can students stand on one foot? Stand on their head? If students are older, allow them to explore their pulse rate. Teach them how to count the number of times their hearts beat in fifteen or thirty seconds, and how to calculate the number of times it beats in a minute. How many times does it beat in a hour? A day? A week?

Closing (10 minutes)

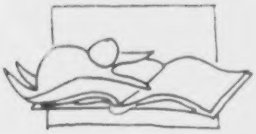
In closing, allow students to offer their ideas regarding what individuals might be interested in some of the ***personal statistics** they just gathered. Ask them, for example, if they think a hat maker would be interested in the data that was collected in class today about head circumferences. Why? Who might be interested in the circumference of fingers or wrists?

Parent Link

Have students inquire about personal statistics related to their births. Can parents remember what time of day and what day of the week students were born? Their measurements and weight? Were there any particular characteristics that made them unique as newborns? (For example, were they born with light hair that later turned dark? Did they have eyes that later changed color?) How do students' newborn personal statistics compare to those of their parents'?

Enlace familiar

Diga a los estudiantes que pregunten acerca de los datos personales de su nacimiento. ¿Pueden los padres recordar la hora y el día en que los estudiantes nacieron? ¿Qué tal su tamaño y su peso? ¿Tenian alguna característica particular que los hizo únicos cuando eran recién nacidos? (Por ejemplo, ¿nacieron con cabello claro y con el tiempo se volvió obscuro? ¿Tenían diferente color de ojos cuando recién nacidos?) ¿Pueden los padres recordar sus propias características? ¿Cómo se comparan los datos personales de los estudiantes recién nacidos a los de sus padres?



Literature Link

How Big Is a Foot?, by Rolf Myller, provides a wonderful literature link to this lesson. This story, recommended for grades K-5, shows the need for a standard unit of measure through the story of a carpenter who uses his own feet to measure a bed to be built for the queen.

Inch by Inch, by Leo Lionni, also focuses on the topic of measurement. This book is recommended for grades K-2.

Handout 48.1

Taking Measurements

1. Length of fingers
2. Length of hand
   (wrist to middle fingertip)
3. Length of arm
4. Length of foot
5. Arm span
6. Width of eyes
7. Width of nose
8. Width of mouth
9. Circumference of head
10. Circumference of wrist
11. Circumference of neck
12. Circumference of the waist
13. Circumference of hips

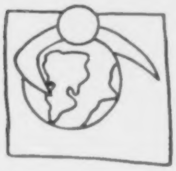
Hoja de trabajo 48.1

Tomamos medidas

1. Largo de los dedos
2. Largo de la mano (de la muñeca a la punta del dedo medio)
3. Largo del brazo
4. Largo del pie
5. Extensión de los dos brazos
6. Ancho de los ojos
7. Ancho de la nariz
8. Ancho de la boca
9. Circunferencia de la cabeza
10. Circunferencia de la muñeca
11. Circunferencia del cuello
12. Circunferencia de la cintura
13. Circunferencia de las caderas

Lesson 49

The Punnett Game
El juego de Punnett



Overview

This lesson provides students with an opportunity to understand why they possess certain characteristics. Through an introduction to basic genetics, they explore the concept of hereditary traits.

Resumen

En esta lección se les presenta a los alumnos la oportunidad de comprender porqué poseen ciertas características. A través de una introducción básica a la genética, exploran el concepto de las características hereditarias.

Key Skills

Classifying

Formulating hypotheses

Observing

Writing

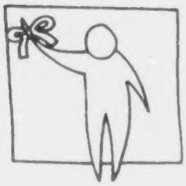
Destrezas claves

Clasificar

Formular hipótesis

Observar

Redactar



Preplanning

1. On each of the 1" x 1" paper squares, write either a capital "Z" or a small "z". Make sure that your capital letter is easily distinguishable from the lower case letters. Make equal numbers of each, and place them in the large envelope.
2. On chart paper, or on the chalkboard, write the meaning of the "Z's". (See Figure 1.)

Figure 1

Eye Color Characteristics

Z = Black or brown eyes

z = Blue or green eyes

Big Z is stronger than little z

ZZ = Black or brown eyes

Zz = Black or brown eyes

zz = Blue or green eyes

Figura 1

Características del color de los ojos

Z = Ojos negros o cafés

z = Ojos azules o verdes

La Z mayuscula es mas dominante que la z minuscula.

ZZ = Ojos negros o cafes

Zz = Ojos negros o cafes

zz = Ojos azules o verdes

3. Make copies of Handout 49.1, "The Punnett Square." One handout is needed for every two students.
4. Read "Background for the Teacher."
5. Keep in mind that you may have children in your class who are adopted or in foster care. These children may have little information about their biological family. Preview the lesson with this in mind, and make sure not to structure the activities in a way that might force a child to reveal personal information about his/her family situation.
6. Review the following vocabulary:

***genetics**	***genética**
***inheritance**	***herencia**
***hereditary**	***hereditaria**

Background for the Teacher

For many years, people had noticed certain physical ***characteristics** found in plants, animals, or people and their offsping. People noticed that some characteristics were the same, and others were different between members of one generation and the next. Even though this phenomenon was noticed a long time ago, biological principles that explain similarities and differences within generations were not developed until very recently. The first good explanation surfaced around 100 years ago, and almost everything we know about this science was developed after 1900.

In living things, scientists have found thousands of ***characteristics** that are ***hereditary**. That is to say, these characteristics are transmitted from parents to children. A characteristic that can be transmitted to offspring is called a "hereditary trait." In humans, you have probably noticed that eye color, hair color, and the shape of one's face and body, can be passed onto children. This passing on of characteristics is called ***inheritance**. The branch of biology that studies inheritance is called ***genetics**.

Most of modern genetics is based on the studies of an Austrian monk named Gregory Mendel (1822-1844). Mendel lived in a monastery and studied math and biology at the University of Vienna. In his studies, he became interested in improving plants by cross-breading plants with different characteristics. Working with pea plants, Mendel discovered the basic principles of genetics, which explain how characteristics are inherited in living organisms.

Información para el/la maestro/a:

Por muchos años se habían notado ciertas características físicas que se encontraban en plantas, animales, o personas y su descendencia. Se notaba que algunas características eran iguales y otras diferentes entre miembros de una generación y la siguiente. Aunque este fenómeno se había observado hace mucho, muy recientemente se desarrollaron los principios biológicos que explican los parecidos y las diferencias entre generaciones. La primera buena explicación surgió hace alrededor de cien años, y casi todo lo que sabemos de esta ciencia se desarrolló después de 1900.

En los seres vivientes, los científicos han encontrado miles de ***características *hereditarias**. Es decir, estas características se transmiten de padres a hijos. Se le llama hereditaria a una característica que se puede transmitir de padre a hijo. En el ser humano, probablemente hayan notado ustedes que el color de los ojos, el color del cabello, y la forma de la cara y el cuerpo se puede pasar a los hijos. Esta transmisión de características se llama ***herencia**. La rama de la biología que estudia la herencia se llama ***genética**.

Casi toda la genética moderna está basada en los estudios de un monje austriaco llamado Gregory Mendel (1822-1844). Mendel vivía en un monasterio y estudió matemáticas y biología en la Universidad de Viena. En sus estudios, le interesaba mejorar algunas plantas cruzándolas con otras de características diferentes. Trabajandō con plantas de arveja (guisante, chícharos), Mendel descubrió los principios básicos de la genética que explican cómo ciertas características son heredadas por los organismos vivos.

Suggested Time

10 minutes — Welcoming
45 minutes — Homework/Learning Options
10 minutes — Discussion
30 minutes — The Punnett Game
15 minutes — Journal
10 minutes — Closing

2 hours total

Materials

A teacher can conduct this lesson alone, if necessary. Materials needed are:

- ☆ A large envelope.
- ☆ 1" x 1" paper squares (enough so that every pair of students receives four squares).
- ☆ Handout 49.1, "The Punnett Square."
- ☆ Chart paper or chalkboard and marker.

Suggested Quote/Cita sugerida

I am new. History made me... I was born at the crossroads and I am whole.

—Aurora Levins Morales as quoted in *The Fire in Our Souls*

Ms. Morales writes poetry, nonfiction, and fiction, has worked in radio and theater, and is the coauthor of *Getting Home Alive*, a collection of poetry and prose, with her mother Rosario Morales.

Yo soy nueva(o). La historia me hizo... Yo nací en una encrucijada y soy completa(o).

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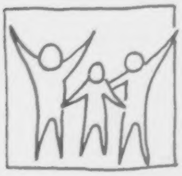
La manera en que los indios dicen "ver" es cuanto se puede uno aproximar a la forma verdadera de las cosas, la forma en que un venado ve una piedra, o la forma en que una rana ve el agua, nosotros llamanos a eso "ver". Todo ser humano tiene esa misma forma de ver.

—Jimmy Santiago Baca

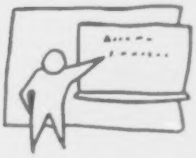


Welcoming (10 minutes)

Welcome students and take attendance. Review the concepts that have been introduced in the unit thus far, and tell students that today they will be learning why they have certain ***characteristics**. Unlike the personal statistics we looked at in the last lesson, today we will look at things about you that will not change. For example, your height and weight will change over time, but will the color of your eyes?

Homework/Learning Options (45 minutes)

Students should use this time to complete any homework assignments, do free reading, receive individualized tutoring, or do any other program-related activity.



Curriculum

Discussion (10 minutes)

Begin a discussion about the concept of genetics and inheritance by asking students if they look like anyone in their family. Ask students if they think they look like their mother or their father, a brother, or a sister. After they have been able to think about any family resemblances, ask them if they know why they look like these family members. Tell students that many children look like their parents because of something called ****genetics***, or ****genetic characteristics***.

Tell them the following:

"****Genetics*** is the branch of science that studies why certain ****characteristics*** are passed on from generation to generation. If you have the same color eyes, or hair, as your mother or father, we say that you ****inherited*** these characteristics — you inherited the color of their eyes or hair. Characteristics are ****hereditary*** if they can be passed on from your parents to you. Can you think of why you might have ****hereditary*** traits? Have you ever wondered why you ****inherited*** a certain characteristic from your mother instead of your father?"

Explíque a los alumnos:

"La ****genética*** es la rama de ciencia que estudia porqué ciertas ****características*** son pasadas de padres a hijos. Si alguien tiene el mismo color de ojos o cabello que su mamá o papá, decimos que heredó estas características — heredó el color de ojos o cabello. Estas caracteristicas se llaman ***hereditarias** si se pueden pasar de padres a hijos. ¿Pueden pensar en porqué tendrán caracteristicas hereditarias? ¿Se han preguntado alguna vez porqué habrán heredado ciertas características de su mamá y no de su papá?"

The Punnett Game (30 minutes)

Tell students that they are going to play a game to decide what color eyes their pretend children will have. Explain that you have a letter in an envelope that represents pretend eye color, and by that we will determine what color eyes students' pretend children can have.

Divide students into pairs, and allow each one to randomly select two trait cards ("Z" or "z"). When students pair up, they will have four trait cards between the two of them. Distribute Handout 49.1, "The Punnett Square," to every pair. Display the chart you have prepared, and explain the following procedures:

"A big 'Z' is the character trait for dark eyes — either brown or black. The little 'z' is the character trait for light eyes — either green or blue. Before we decide what color eyes your children will have, you need to determine what color eyes you have. If you have two big 'Z's' in your hand then you have dark eyes. If you have two little 'z's' you have light eyes, but what happens if you have a big 'Z' and a little 'z'? The character trait for dark eyes, or big Z's, are stronger than light eyes (or are dominant), and so you will also have dark eyes. The only way you can have light eyes is with two small 'z's' but there are two ways to have dark eyes."

"Now, you will team up with someone and see what color eyes your 'children' might have. Using the handout, put your character traits on the top. Your team member will put his/hers on the left- hand side. One letter should be placed near, not inside, each box. (Figure 2 demonstrates how this will look)."

Figure 2

	Z	Z
z	Zz	zz
z	Zz	zz

"Now, without touching the little pieces of paper, write in the combinations of character traits that your pretend children might have. In each box, you need to write the two letters which are on the outside of that box. Refer to Figure 2. You may want to illustrate this procedure on the board if students have difficulty with it."

Explíque a los alumnos:

"La 'Z' mayúscula es la característica para ojos obscuros — ya sean cafés o negros. La 'z' minúscula es la característica para ojos claros — ya sean verdes o azules. Antes de decidir qué color de ojos van a tener sus 'hijos,' hay que determinar qué color de ojos tienen ustedes".

"Si tienes en la mano dos 'Z' mayúsculas, entonces tienes ojos obscuros. Si tienes dos 'z' minúsculas, entonces tienes ojos claros. Pero ¿qué pasa si tienes una 'Z' mayúscula y una 'z' minúscula? ¿La característica para ojos obscuros, o sea la 'Z' mayúscula, es más dominante que la de ojos claros, así es que tú tambien tendrás ojos obscuros. La única manera de tener ojos claros es con dos 'z' minúsculas, pero hay dos maneras de tener ojos obscuros".

"Ahora vas a formar un equipo con otra persona para ver qué color de ojos podrían tener sus 'hijos'. Usando la hoja, una persona anota sus características en la parte de arriba, y la otra anota las suyas al lado izquierdo. Se debe poner una letra cerca de cada cuadrito, no dentro de el".

"Ahora, con lápiz y sin tocar los papelitos, van a anotar la combinación de características que podrián tener sus 'hijos.' Dentro de cada cuadro hay que combinar y anotar las dos letras de afuera del cuadro. Si esto les causa dificultad a los niños, se puede ilustrar el procedimiento en la pizarra".

After students have written in the four combinations of letters, have them interpret the results. In each box is a possible combination that describes the color of eyes their child might have. Explain to students that depending on the parent's traits, a child could be born with either light or dark eyes. However at other times, such as when both parents have light eyes, the child will have light eyes — there is no chance that the child will have dark eyes.

Allow students to interpret their results and share them with other teams. Explain that this activity was called the "Punnett Square," because Punnett was the last name of the scientist who discovered this.

Journal (15 minutes)

Allow students to write in their journals about the day's activity. Have them describe what they learned, and in particular discuss some of the characteristics they feel they may have inherited from their parents or grandparents based on today's activity and last lesson's Parent Link.

Closing (10 minutes)

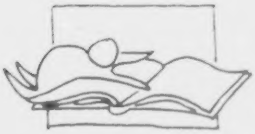
Have a few volunteers read from their journals. Tell students that in the next activity, they will work together and continue to explore individual characteristics. The next lesson does this by focusing on chance, and something called "probability."

Parent Link

Have students work with their parents to write a one paragraph entry in their journals about a unique family trait that is treasured the most by the entire family. Have students involve their family members in reaching consensus about the one trait. You can also allow students to write about one particular trait that no one in the family shares with anybody else. The Literature Link below offers a wonderful example of this, and could be incorporated into todays lesson.

Enlace familiar

Pida a los estudiantes que trabajen con sus padres para escribir un párrafo en sus diarios acerca de la características familiares únicas y muy preciadas por la familia. Pida a los estudiantes que se pongan de acuerdo con su familia para determinar una característica familiar. También los estudiantes pueden escribir acerca de una característica en particular que, por ejemplo, ningún miembro en la familia comparta con otro miembro. El enlace literario de esta lección ofrece un buen ejemplo sobre este tema, el cuál puede ser incorporado en la lección de hoy.



Literature Link

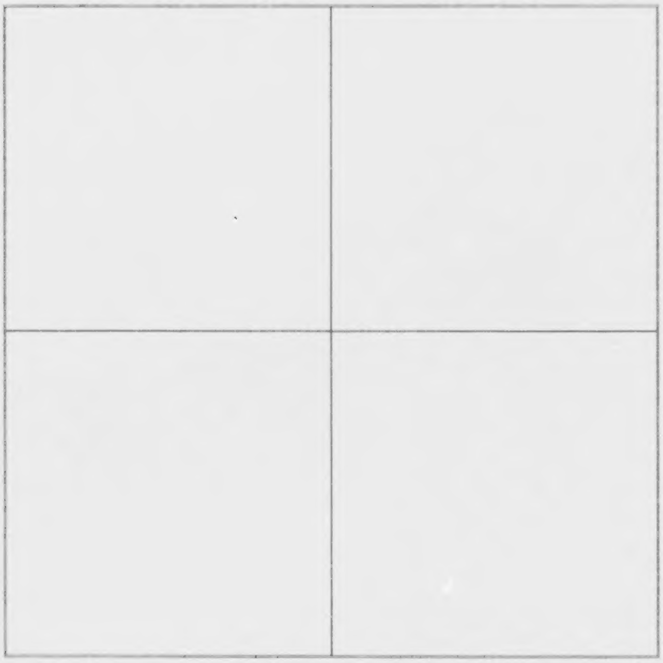
In the bilingual picture book, *Hairs/Pelitos*, Sandra Cisneros tells about all the different kinds of hair found in one family as a way to address the beauty of diversity beginning with the people closest to us. Recommended for grades K-3.

Handout 49.1

The Punnett Square

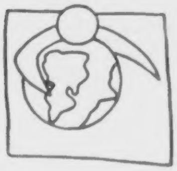
Hoja de trabajo 49.1

El cuadrado de Punnett



Lesson 50

What Are the Chances?
¿Qué es la probabilidad?



Overview

As an extension to Lesson 48, this lesson focuses on the concept of probability and the role it plays in determining inherited traits such as eye color. The problem-solving activity used in this lesson was adapted from an activity called "The Hog Game," published by the Mathematical Sciences Education Board.

Resumen

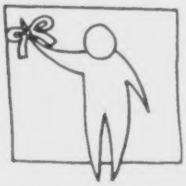
Como extensión a la Lección 48, esta lección se enfoca en el concepto de la probabilidad, y el papel que juega en la determinación de ciertas características hereditarias, como el color de los ojos. La actividad de resolver problemas usada en esta lección fue adaptada de la actividad llamada "El juego del cerdo", publicada por la Comisión de Educación de Matemáticas y Ciencias.

Key Skills

Predicting
Calculating
Cooperating
Role-playing

Destrezas claves

Hacer predicciones
Calcular
Cooperar
Hacer dramatizaciones



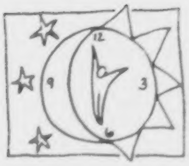
Preplanning

1. Review the instructions for the "What are the Chances?" game provided in the procedures section below.

2. Prepare (or buy) the appropriate number of numbered cubes. Dice make great numbered cubes, as do small cubes of wood with the numbers 1-6 written on the sides.
3. Review the following vocabulary:

   probability ***probabilidad***

4. Review today's lesson from the point of view of an adopted child and/or a child who may not know her/his biological families.
5. Be clear in your explanation to students, and any parents, that you are using numbered cubes or dice to teach about probability. You are not teaching children to gamble. Because some families may have strong feelings about children tossing dice, consider making wooden number cubes (with numerals and not dots).



Suggested Time

10 minutes — Welcoming
45 minutes — Homework/Learning Options
20 minutes — Guided Discussion
30 minutes — What are the Chances?
5 minutes — Debriefing
10 minutes — Closing

2 hours total

Materials

A teacher and teaching assistants are necessary to implement this lesson. You will need the following materials:

- Cups (one for each cooperative learning team).
- Numbered cubes (eight for each cooperative learning team).

Suggested Quote/Cita sugerida

I am new. History made me... I was born at the crossroads and I am whole.

—Aurora Levins Morales as quoted in *The Fire in Our Souls*

Ms. Morales writes poetry, nonfiction, and fiction, has worked in radio and theater, and is the coauthor of *Getting Home Alive*, a collection of poetry and prose, with her mother Rosario Morales.

Yo soy nueva(o). La historia me hizo...Yo nací en una encrucijada y soy completa(o).

—Aurora Levins Morales

The way the Indians say "seeing" is how close you can come to the way things really are, the way a deer sees a rock, or the way a frog sees water; we call that "seeing." Every human being has that seeing in them...

—Jimmy Santiago Baca as quoted in *The Fire in Our Souls*

Mr. Santiago Baca is a playwright, poet, and novelist. His works include *Black Mesa Poems* and the autobiography, *In the Way of the Sun*. In 1989, he was awarded the National Hispanic Heritage Award.

La manera en que los indios dicen "ver" es cuanto se puede uno aproximar a la forma verdadera de las cosas, la forma en que un venado ve una piedra, o la forma en que una rana ve el agua, nosotros llamanos a eso "ver". Todo ser humano tiene esa misma forma de ver.

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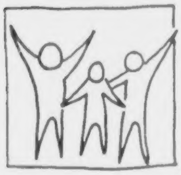
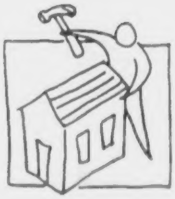


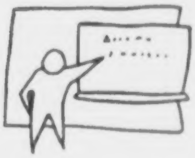
Welcoming (10 minutes)

Welcome students and take attendance. Tell students that today they will continue discussing the Punnett game. Review the procedures involved with the Punnett game, and ask students if any of them wondered why the same two parents could have children that looked completely different. Do any of the students know brothers and/or sisters who have the same two parents but they (the brothers and/or sisters) have different color hair, different color eyes, or one is short and the other tall? Ask students if they know how this could happen. Let them know that in this lesson they will investigate how this can happen by using math.



Homework/Learning Options (45 minutes)

This time should be used by students to complete homework assignments, receive individualized tutoring, or do free reading.



Curriculum

Guided Discussion (20 minutes)

Introduce students to the concept of ***probability*** by explaining the following:

"***Probability*** is another way to say what the 'likelihood' of something happening is. For example, the ***probability*** that you will go to school on Saturday is zero, or not very good. But the ***probability*** that you will go to sleep tonight is very high — about 99% — or good. The probability of something happening is the chance or likelihood that a certain event will happen. Part of ***genetics***, and the inheritance of certain traits is based on probability or chance.

Let's see if we can figure out the probability of the following events:

- What is the ***probability*** that it will rain tomorrow? [Depends on the season.]
- What is the ***probability*** that if I toss a coin in the air it will land heads up?
- What is the ***probability*** that if I toss a coin in the air it will land heads down?
- What is the ***probability*** that you will have dark hair if both of your parents have dark hair?
- What is the ***probability*** that you will be really tall if both of your parents are short?"

"If we remember our results from the Punnett game, we can figure out the ***probability** of having children with blue or green eyes, or brown or black eyes. The ***probability** depends on what color eyes the parents have. Take out the Punnett game sheets you worked on in the last lesson, so we can figure out what the probability of having children with certain color eyes is, depending on the parents' characteristics."

Explíque a los alumnos:

"La ***probabilidad** es otra manera de decir qué posibilidad hay de que algo vaya a pasar. Por ejemplo, la ***probabilidad** de que ustedes vayan a la escuela el sábado es cero, o sea, no es muy alta. Pero la ***probabilidad** de que vayan a dormir esta noche es muy alta. La probabilidad de que algo vaya a pasar es la oportunidad o casualidad de que suceda alguna cosa. Parte de la ***genética** y la herencia de ciertas ***características** tiene que ver mucho con la probabilidad".

"Vamos a ver si podemos calcular la probabilidad de que sucedan las siguientes cosas:

- ☆ ¿Qué ***probabilidad** hay de que llueva mañana? [Depende de la temporada].
- ☆ ¿Qué ***probabilidad** hay de que si avíento una moneda en el aire caiga cara arriba?
- ☆ ¿Qué ***probabilidad** hay de que si aviento una moneda en el aire caiga cara abajo?
- ☆ ¿Qué ***probabilidad** hay de que tengas cabello obscuro si tus papás los dos tienen cabello obscuro?
- ☆ ¿Qué ***probabilidad** hay de que seas alto si tus papás los dos son bajos?"

"Si recordamos los resultados del Cuadro de Punnett podemos calcular la ***probabilidad** de tener hijos de ojos verdes o azules, cafés o negros. La probabilidad depende del color de ojos de los padres. Saquen la hoja del Cuadro de Punnett de la lección anterior, y podremos calcular la ***probabilidad** de tener hijos con cierto color de ojos, dependiendo de las características de los padres".

Allow children time to review these sheets with the partner they worked with in the last lesson, and to review the results of the Punnett game. If students are capable of working with fractions or percentages, allow them to determine the probability in this manner. If we use the example provided in Lesson 48, then we can state that the probability of having a child with blue or green eyes (the combination of two lower-case "z's" together) is 2 out of 4, ½, or 50%. The probability of having children with dark eyes (two upper-case "Z's" together, or a combination of "Z" and "z") is also 2 out of 4, ½, or 50% in this same example.

If your students are not familiar or comfortable with fractions or percentages, point out the various possible combinations that determine eye color. For example, if all four combinations in the Punnett Square lead to dark color eyes, then the probability for having light color eyes is "not good," while the probability for having dark color eyes is "good." If, for example, the parent combination is "Zz" and "Zz," the Punnett Square tells us that there is a "higher" probability that the child will have dark eyes (3 out of 4, or 75% chance), and a "lower" probability that the child will have light eyes (1 out of 4, or 25% chance).

Make sure that students understand that each square does not represent a child, but the ***probability*** of that child possessing that particular characteristic.

What are the Chances? (30 minutes)

Each cooperative learning team should have eight dice or cubes (cubes numbered from one to six), and one cup. (Have each team appoint a Materials Monitor to retrieve all necessary materials.) Review the examples and instructions provided with the lesson to be sure that everyone understands the rules of the game.

Provide students with the following information:

"The object of the game is to get as high a score as you can. You will need the dice or numbered cubes, a cup, sheet of paper, and a pencil. For example, if you roll a 3 and a 2, your total score is 5. This is because 3 plus 2 is equal to 5. Your score is the total of the numbers you roll on the numbered cubes. You add up the numbers and this is your score, unless on one or more cubes you roll a 1. If you roll a 1, then your score is automatically 0."

"Put as many of the cubes (up to eight) as you want in the cup. Roll that many number cubes from the cup. If none of the numbers you rolled is a 1, then your score is the sum of the numbers you rolled. If a 1 comes up on any of your number cubes, then your score is 0. For example, let's say that I wanted to put 4 numbered cubes in the cup. I roll the number cubes and I get the following numbers: 3, 3, 6, and 2. Since I didn't get any 1's, my score is 3 + 3 + 6 + 2 or 14."

"On my second turn, let's say that I want to put all 8 number cubes in the cup. This time I roll the following numbers: 4, 1, 3, 3, 2, 5, 6 and 1. Because I got a 1 (I actually rolled two 1's), my score is 0 this time."

"On my third try, I decide I only want to put 2 cubes in the cup. I roll the numbers 4 and 5. This time, because I didn't roll a 1, my score is 4 + 5 or 9."

"Everybody in your cooperative learning team will take turns choosing how many number cubes they in want in the cup, and rolling that many cubes from the cup. The group should agree on the score of each member, and should choose a Recorder to keep track of team member's scores. The Recorder must also participate in the game."

Dígale a los alumnos:

"El objetivo del juego es ganar el mayor número de puntos que sea posible. Van a necesitar los cubos númerados, un vaso, papel y lápiz. Por ejemplo, si tiran los cubos y salen un 3 y un 2, ganan 5 puntos, porque 3 más 2 son 5. Su marca es la suma total de los números que tiren, a menos de que salga el número 1. Si sale el número 1, la marca siempre será cero".

"Pongan en el vaso todos los cubos que quieran tirar, hasta ocho. Tiren los cubos del vaso. Si no sale el número l en ninguno, la marca es la suma de los números que salieron. Si sale el número 1, la marca es cero. Por ejemplo, supongamos que yo quiero poner en el vaso cuatro cubos . Tiro los cubos y salen 3, 3, 6, y 2. Como no salió el número 1, mi marca es 3+3+6+2, o sea 14".

"La segunda vez decido que quiero poner en el vaso todos los 8 cubos. Esta vez salen 4, 1, 3, 3, 2, 5, 6 y 1. Como salió el número "1" (salió dos veces), mi marca es 0".

"La tercera vez decido que sólo voy a poner en el vaso dos dados. Salen 4 y 5. Esta vez, como no salió el número 1, mi marca es 4+5 ó 9".

"Todas las persona del equipo se van a turnar para escoger cuántos cubos quieren poner en el vaso, y para tirar los cubos. El equipo tiene que estar de acuerdo con la marca de cada uno, y tambíen deben escoger un apuntador para apuntar las marcas de cada persona. El apuntador también debe participar en el juego".

Debriefing (5 minutes)

Review the concept of probability by asking students what they thought was the best way to earn points. Did they think they had a better chance of earning points with fewer cubes, or with more cubes in the cup? Ask a number of students for their strategies, and a reason for choosing that strategy. Make sure that at least one member from each cooperative learning group is given an opportunity to present their strategy.

Closing (10 minutes)

In closing, encourage students to review the concept of probability and genetics by asking a few student volunteers to explain how they would tell someone in their family what they learned today.

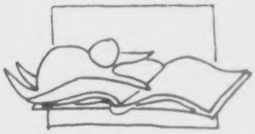
Parent Link

Have students work with their parents in creating a simple family tree, one that goes back to students' great-grandparents would be good. Have students start with themselves and their siblings, if they have any, at the top of the tree, followed by students' parents, their parents' parents, and their parents'

grandparents. The tree can include the following information: name, date, and place of birth as well as the names of the countries the family members may have moved from, who they married, and any other information that they choose to record.

Enlace familiar

Pida a los estudiantes que trabajen junto a sus padres para crear un árbol genealógico de la familia que incluya a sus bisabuelos. Diga a los estudiantes que empiezen con ellos mismos y sus hermanos, si es que tienen, en la parte de arriba del árbol siguiendo debajo con sus padres, sus abuelos, y sus bisabuelos. El árbol puede incluir la siguiente información: nombre, fecha y lugar de nacimiento como también el nombre de los paises de donde los miembros de la familia imigraron.



Literature Link

Jumanji, written by Chris Vans Allsburg, provides students with a wonderful account of probability. Students investigate dice and discover the probability of two sixes being rolled. Recommended for grades K-5.

Lesson 51

Learning from History
Aprendiendo de la historia

Overview

In this lesson, students discover their own unique history by creating time lines to record important events in their lives (the birth of a brother or sister, starting school, moving to a new city) and important accomplishments (such as learning to read, learning to ride a bike, and so forth).

Resumen

En esta lección, los alumnos descubren su historia particular al crear una cronología para registrar los eventos importantes de sus vidas — el nacimiento de un hermano o hermana, el primer día de escuela, el cambio a una ciudad nueva — o logros importantes, como aprender a leer, aprender a manejar bicicleta, etc.

Key Skills

Creating

Sequencing

Recalling

Writing

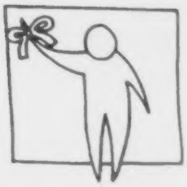
Destrezas claves

Crear

Organizar secuencias

Recordar

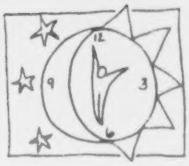
Redactar



Preplanning

1. Prepare a timeline that depicts some of the important events in your own life. This will provide students with an opportunity to see a graphic representation of time, and to get a sense of the relative size of numbers. Make sure the timeline you create to demonstrate the activity includes the year you are depicting, your age in that year, a graphic and a written representation of the event you are describing.

2. As in Lesson 48, keep in mind that you may have children in your class who are adopted or who are in foster care. These children may have little information about their biological family or personal history. Preview the lesson with these children in mind. For example, instead of having everyone use one page for every year of their lives, you could give them the option of making one page for each year they remember or think of as important. Instead of emphasizing family-related events, have them think about something that they themselves did — going to a circus, getting a pet, etc.



Suggested Time

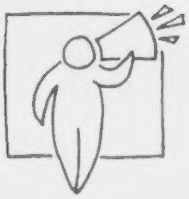
10 minutes — Welcoming
45 minutes — Homework/Learning Options
45 minutes — Creating a Timeline
10 minutes — Debriefing
10 minutes — Closing

2 hours total

Materials

A teacher can conduct this lesson alone. The following materials will be needed:.

- ☆ Plenty of plain white paper.
- ☆ Tape.
- ☆ Pens or pencils.
- ☆ Drawing materials (crayons, markers, paints, etc.).



Suggested Quote/Cita sugerida

I am new. History made me... I was born at the crossroads and I am whole.

—Aurora Levins Morales as quoted in *The Fire in Our Souls*

Ms. Morales writes poetry, nonfiction, and fiction, has worked in radio and theater, and is the coauthor of *Getting Home Alive*, a collection of poetry and prose, with her mother Rosario Morales.

Yo soy nueva(o). La historia me hizo…Yo nací en una encrucijada y soy completa(o).

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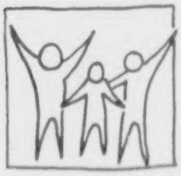


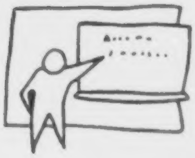
Welcoming (10 minutes)

Welcome students and take attendance. Provide them with a few minutes to chart their cooperative learning team's recycling contributions. Remind students that they only have a few more opportunities to bring in cans.

Tell students that in this lesson they will continue to explore their individuality and uniqueness by studying their history. Tell them that although we often study the history of countries, famous people, and our families, we rarely have the opportunity to study our own personal history. Let them know that today they will be studying their own history. Remind them that, even though their history may not be very long or detailed because they are still so young, they still do possess their own unique history. Before students begin to create their timelines, take a few minutes to model one by making and sharing your own.

Homework/Learning Options (45 minutes)

Students should use this time to complete homework, receive individualized tutoring, or engage in free reading. If time permits, allow students to enter words into their wordbanks.



Curriculum

Creating a Timeline (45 minutes)

Tell students that they will have the next 45 minutes to create their own timeline. Remind them that each one will be different, because each represents the life of a different individual who has had different experiences.

Before students begin, provide them with the following instructions:

"Use the materials provided (paper, pens, pencils, markers) to create your own timeline. Use one sheet of paper to represent each year in your life. So, if you are eight years old you will need eight pieces of paper. If you are ten, you will need ten pieces of paper. On each sheet, you should draw and write about something you did in that year or about something that happened to you. Make sure you write on the bottom of each piece of paper the age you are describing. You can also include the year that you were that age (for example, 1994). After you finish creating a page for every year, you can create the timeline by taping the pieces of paper together in the order of the years."

Díga a los alumnos:

"Cada persona va a usar los materiales que tiene (el papel, los bolígrafos, los lápices, los marcadores) para crear la cronología de su propia vida. Usen una hoja para cada año de sus vidas. Por ejemplo, si alguien tiene ocho años, necesitará ocho hojas. Si alguien tiene diez años, necesitará diez hojas".

"En cada hoja dibujen o escriban acerca de algo que hicieron ese año, o sobre algo que les pasó. En la parte de abajo de cada hoja, apunten la edad que tenían ese año; también pueden poner el año (por ejemplo, 1994). Cuando terminen de crear una hoja para cada año, pueden pegar juntas las hojas, por orden de años para hacer una cronología".

Before students begin, allow a few of them to share with the rest of the class some of the important events they will include in their timeline. Allowing a few students to share these memories will help other students remember some of their own important events.

After students have completed their timelines, assist them in posting them around the room. Allow students to "roam the room" and view their classmates' work.

Optional Activity

If you are working with older students, you may want to provide them with an additional mathematical challenge by substituting the individual pieces of paper with long strips of paper. Ask each child to divide the strip of paper into the appropriate number of equal sections, a section for each year of his/her life. Allow students to explore different options in figuring this out. You may want to supply students with rulers.

You may also do this activity as a visual timeline: tell each student to bring in several old magazines and have them create a collage that is a visual personal history. This works wonderfully with young students, as well as with visual learners!

Debriefing (10 minutes)

Use this time to allow students to continue "roaming the room." Ask them to pay special attention to the similarities and differences in their classmates' timelines. Stress that, although many of the events in their lives may be the same, they probably occurred at different times and in different ways — each student has her or his own unique history.

Closing (10 minutes)

In closing, ask a few volunteers to read their timelines out loud to the rest of the class. Take some time to discuss the similarities and differences they observed.

Parent Link

Ask students to share their histories with their parents, and request that they get their parents to share their histories with them. Remind students to find out how many years ago certain events happened in their parents' lives.

Enlace familiar

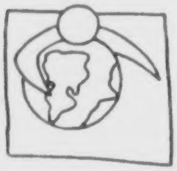
Pida a los alumnos que compartan sus historias con sus padres y estos con sus hijos. Diga a los alumnos que pregunten a sus padres cuanto tiempo atrás fue que ocurrieron ciertos eventos en sus vidas.

Literature Link

In *América Is Her Name/La llaman América*, Luis J. Rodriguez tells the "unique story" of a Mixteca girl who lives in Chicago. A visiting poet encourages her to write poetry as way of dealing with her environment. Her family members not only support her in this endeavor but also join her in writing. It is an inspiring and real-life story with fabulous illustrations. (Bilingual edition.) Recommended for grades 1-4.

Lesson 52

Learning from Artifacts
Aprendiendo de los artefactos



Overview

Students continue to learn about the past by gathering other forms of information — artifacts and stories left by people long ago. They apply this new knowledge of the past to their understanding of some of the global problems we are faced with today.

Resumen

Los alumnos siguen estudiando el pasado al reunir otros tipos de información, como por ejemplo artefactos e historias que la gente dejó hace mucho tiempo. Aplican este nuevo conocimiento del pasado a su comprensión de algunos problemas mundiales que enfrentamos actualmente.

Key Skills

Observing

Classifying and sorting

Recording

Listening

Writing

Destrezas claves

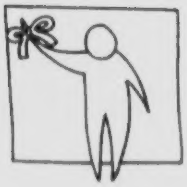
Observar

Clasificar y separar

Registrar

Escuchar

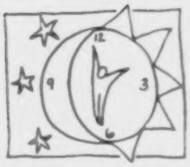
Redactar



Preplanning

1. Review the following vocabulary:

* *artifact*	* *artefacto*
* *archeology*	* *arqueología*



Suggested Time

5 minutes — Welcoming
45 minutes — Homework/Learning Options
25 minutes — Walk Around the Neighborhood
20 minutes — Learning from Artifacts
20 minutes — Journal
5 minutes — Closing

2 hours total

Materials

A teacher and teaching assistants are needed to facilitate this lesson. The activity in this lesson requires exploring the area surrounding your Academia site, and would work best with a number of "guides."

You will need:

- ☆ Paper or plastic bag (one for each pair of students).
- ☆ Pieces of sturdy, thick paper or cardboard (one for each pair).
- ☆ Glue and markers.

Suggested Quote/Cita sugerida

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—Aurora Levins Morales as quoted in *The Fire in Our Souls*

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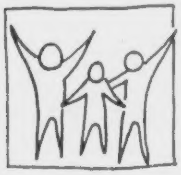
La manera en que los indios dicen "ver" es cuanto se puede uno aproximar a la forma verdadera de las cosas, la forma en que un venado ve una piedra, o la forma en que una rana ve el agua, nosotros llamanos a eso "ver". Todo ser humano tiene esa misma forma de ver.

—Jimmy Santiago Baca

SESSION PLAN



Welcoming (5 minutes)

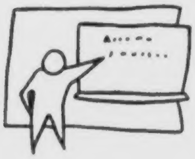
Welcome students and take attendance. Tell them: "Today, you will pretend to be ***archaeologists** in the future, and will explore your neighborhood in order to gather information about the way people lived in (name current year). ***Archaeology** is the study of people and animals that lived long ago. ***Archaeologists** have discovered the remains of lost cities buried underground, and the bones of animals that lived long ago and are now extinct, like dinosaurs. Today, you will take a walk around the neighborhood with a partner to gather both natural and man-made materials."

Díga a los alumnos:

"Hoy vamos a pretender que somos arqueólogos del futuro, y vamos a explorar nuestro vecindario para recoger información sobre cómo vivía la gente en el año (nombrar el año actual). La arqueología es el estudio de la gente y los animales que vivieron hace mucho tiempo. Los arqueólogos han descubierto los restos de ciudades antiguas enterradas, y huesos de animales que vivieron en otros tiempos y ahora se han extinguido, como los dinosaurios. Hoy vamos a dar una vuelta por nuestro vecindario, y cada persona con un compañero, recogerá materiales naturales y materiales hechos por el hombre".

Homework/Learning Options (45 minutes)

Students should use this time to complete homework assignments, do free reading, or receive individualized tutoring.



Curriculum

Walk Around the Neighborhood (25 minutes)

Review with students the necessary rules of behavior prior to their walk around the neighborhood. Tell them that they will be working in pairs, and distribute a bag to each pair. Tell them that they will be collecting both natural and man-made materials they find in their neighborhood, and reviewing the difference between natural and man-made materials, if necessary. The materials collected by each pair of students are ***artifacts** that they will use to make inferences about the neighborhood.

Learning from Artifacts (20 minutes)

Upon returning to the classroom, distribute a piece of paper (or cardboard) to each pair of students. Each student will work with their partners throughout this activity. Provide them with the following instructions:

"Examine the ****artifacts*** you and your partner collected, and discuss any information these reveal to you about the neighborhood surrounding your Academia site. For example, do these materials lead you and your partner to believe that the neighborhood is surrounded by a lot of trees? Classify and sort your ****artifacts*** into different groups that tell you different things about your neighborhood. Do any of your ****artifacts*** tell you, for example, that the neighborhood has paved streets and sidewalks, or that it doesn't? After you have discussed the different ****artifacts*** you have collected, glue or tape an ****artifact*** onto your piece of paper, and write on the paper what you think this ****artifact*** tells us about the neighborhood."

Díga a los alumnos:

"Cada equipo de dos personas va a examinar los ****artefactos*** que recogieron, y discutir qué información revelan acerca del vecindario de la Academia del Pueblo. Por ejemplo, ¿estos materiales les dan la idea de que en esta área hay muchos árboles? Clasifiquen y separen los ****artefactos*** en diferentes grupos según lo que revelen acerca del lugar. ¿Por ejemplo, recogieron algún****artefacto*** que indique que hay calles pavimentadas y banquetas? Después de discutir sobre los ****artefactos*** que hayan recogido, peguen en un papel con la goma o cinta adhesiva, y apunten lo que creen que este ****artefacto*** nos diga acerca de la vecindad".

Journal (20 minutes)

Ask students to spend the next 20 minutes writing in their journals about what they think they would say about their neighborhood if they were archaeologists that lived 500 years from now and discovered the artifacts that the class discovered today. Ask students to accompany their journal entry with an illustration.

Closing (5 minutes)

Allow students to share the artifacts they found with the rest of the class, and to ask questions. Is there agreement in the class about the stories these artifacts tell? Why or why not?

Parent Link

Now that students have this new understanding of archeology, take this opportunity to ask that parents accompany them to a local museum. What stories do the artifacts on exhibit tell? From what is known about these objects, what can they tell about the people they came from? About these people's community life and way of seeing the world?

Enlace familiar

Ahora que los estudiantes tienen un nuevo conocimiento de la arqueología aproveche esta aportunidad para preguntar a los padres si los pueden acompañar a un museo local. ¿Qué historias describen los artefactos que están en exhibición? Con el conocimiento que se tiene de estos objetos ¿qué podrían decir sobre la gente del cuál provienen estos? ¿Qué podrían decir acerca de la comunidad, la vida y la forma de ver el mundo de estas personas?

Lesson 53

What Have We Learned?
¿Qué hemos aprendido?

Overview

Working in cooperative learning teams, students apply their new understanding of themselves and their world in creating solutions to the problems discussed in previous units. They acknowledge the good work they have done in Academia this year as well as their contributions (especially the class recycling project) to the good of the environment.

Resumen

Trabajando en equipos de aprendizaje cooperativo, los alumnos aplican su nueva comprensión de su mundo y de sí mismos al crear soluciones a los problemas presentados en las unidades previas. Reconocen el buen trabajo que han logrado este año en la Academia, y cómo ha contribuído este trabajo al bien del ambiente, sobre todo el proyecto de reciclaje.

Key Skills

Calculating

Interpreting

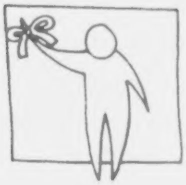
Writing

Destrezas claves

Calcular

Interpretar

Redactar

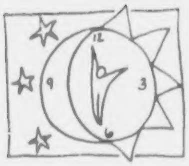


Preplanning

1. Research recycling centers in the area. Determine which recycling center will take the cans the class has been saving, and which center will give you the best rate for the cans. Make sure you note the rate at which you will be able to exchange the cans. You will provide this information to students at Work Station II, and challenge them to calculate the amount of money they will have

earned as a class. Try to convert this rate of exchange into a number that students can easily understand. For example, if the rate of exchange is five cents per pound of cans, calculate the number of cans in a pound. If a pound is approximately equal to eight cans, then you can tell students that the rate of exchange is five cents for every eight cans.

2. Make copies of Handout 53.1.
3. Determine which word game students will engage in at Work Station I. Prepare as necessary. Place each team's wordbank, pencils, and blank word cards at this work station.
4. Secure a printed, audio, or video copy of Dr. Martin Luther King, Jr.'s speech, "I Have a Dream" for Work Station III.
5. Review your procedures and rules for work stations with the teaching assistants, assign teaching assistants to work stations, and make sure each knows her/his responsibilities.



Suggested Time

5 minutes — Welcoming
45 minutes — Homework/Learning Options
20 minutes — Work Station I: Wordbanks and Vocabulary Games
20 minutes — Work Station II: Interpreting the Recycling Contribution Charts
20 minutes — Work Station III: *Nuestro mundo creativo*
10 minutes — Closing

2 hours total

Materials

A teacher and teaching assistants are needed to fully implement this lesson. You will need the following:

- Handout 53.1, "Unit Review of Vocabulary."
- Class recycling chart.
- Paper.
- Pens or pencils.
- Chart paper and markers.
- Blank 3" x 5" index cards for wordbanks.
- Team wordbanks.
- Enough copies of Dr. Martin Luther King, Jr.'s "I Have a Dream" speech for all students (or an audio or videocassette of the speech and the proper equipment).

Suggested Quote/Cita sugerida

I am new. History made me... I was born at the crossroads and I am whole.

—Aurora Levins Morales as quoted in *The Fire in Our Souls*

Ms. Morales writes poetry, nonfiction, and fiction, has worked in radio and theater, and is the coauthor of Getting Home Alive, a collection of poetry and prose, with her mother Rosario Morales.

Yo soy nueva(o). La historia me hizo...Yo nací en una encrucijada y soy completa(o).

—Aurora Levins Morales

The way the Indians say "seeing" is how close you can come to the way things really are, the way a deer sees a rock, or the way a frog sees water; we call that "seeing." Every human being has that seeing in them...

--Jimmy Santiago Baca as quoted in *The Fire in Our Souls*

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La manera en que los indios dicen "ver", es cuanto se puede uno aproximar a la forma verdadera de las cosas, la forma en que un venado ve una piedra, o la forma en que una rana ve el agua, nosotros llamanos a eso "ver". Todo ser humano tiene esa misma forma de ver.

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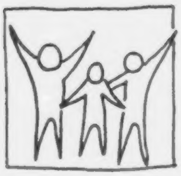
SESSION PLAN



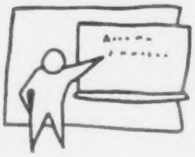
Welcoming (5 minutes)

Welcome students and take attendance. Allow each team to quickly add any last-minute recycling contributions to their team charts. After all the team charts have been updated, select a volunteer to update the class recycling chart. Place all of the recycling charts at Work Station II.

Tell students that today they will be working at work stations and will calculate the number of cans collected by the class through the recycling project. In addition, each cooperative learning team will attempt to calculate the amount of money the class has earned by recycling cans, and create a plan for using these newly-earned funds.

Homework/Learning Options (45 minutes)

Allow students to complete any homework, receive individualized tutoring, or engage in free reading during this time.



Curriculum

Work Stations (20 minutes at each)

Work Station I: Wordbanks and Word Games

If possible, a teaching assistant should staff this station. Teams will use their word banks and the list of key vocabulary, Handout 53.1, as a reference. Give students working at this station a few minutes to review the words that have been introduced in the unit, and to determine as a group which words should be added to their team wordbank. If teams are interested, they may want to review all of the words they have compiled in their wordbanks, and play word games using vocabulary from past units as well.

After students have reviewed the vocabulary, you may reinforce this review by playing one of the various word games suggested previously ("Toss-A-Question," "Send-A-Problem," or "Turn-4-Review"), or one of your own.

Centro de trabajo 1: Banco de palabras y juego de palabras

Si es posible, un asistente debe ser el que diriga este centro de trabajo. Los grupos pueden usar como referencia sus bancos de palabras, la lista del vocabulario clave y la Hoja de trabajo 53.1. Déle a los estudiantes unos minutos para que repasen las palabras que se han introducido en esta unidad y para determinar en grupo qué palabras se pueden añadir a su banco de palabras de grupo. Si los grupos están interesados sería buena idea que repasen todas la palabras que han recopilado en sus bancos de palabras, luego pueden jugar juegos de palabras usando el vocabulario de unidades previas.

Después de que los estudiantes repasen el vocabulario, puede reforzar el repaso jugando uno de los varios juegos de palabras sugeridos en lecciones previas ("Toss-A-Question," "Send-A-Problem" o "Turn-4-Review") o uno de los suyos.

Work Station II: Interpreting the Recycling Contribution Charts

The teacher or a teaching assistant should staff this work station. Using the class and team recycling charts, paper, and pencils, challenge each team working at this station to calculate the total number of cans collected by the class. After students have finished, ask them if they can calculate the amount of money they can earn by recycling the cans at the rate of exchange you found.

Ask students to write their calculations on the chart paper provided. If time permits, ask each team working at this station to provide the class with some of their ideas regarding how they would like to spend the money they earned through recycling. These ideas should also be written and displayed on the chart paper.

Centro de trabajo 2: Interpretando el cuadro de contribución de reciclaje

Un maestro o un asistente debe dirigir este centro de trabajo. Usando los cuadros de reciclaje de la clase, papel, y lápices, diga a los estudiantes del grupo que hagan un estimado del número total de latas que han sido colectadas por la clase. Después que los estudiantes hayan terminado, pídales que calculen el dinero que ellos pueden ganar reciclando las latas al costo que ellos encontraron.

Diga a los estudiantes que escriban sus estimados en el papel grande que se les ha proveido. Si tienen tiempo diga a cada grupo que está trabajando en este centro de trabajo que informen a la clase sus ideas acerca de cómo les gustaría gastar el dinero que se ganaron haciendo el reciclaje. Estas ideas se deben escribir y exhibir en el papel grande.

Workstation III: *Nuestro mundo creativo*: Dream a World Poems

At this work station students will write a poem modeled after Dr. Martin Luther King, Jr.'s "I Have a Dream" speech.

Before writing, read the speech with students or listen to it together. (The speech is available on both video and audiocassette.) After you have heard and/or read the speech in class and discussed it, tell students that they will be writing their own "dream poem" about a specific environmental problem that they feel very strongly about. (If students are younger, you can divide them into their cooperative learning groups and have them compose a group poem instead.)

You might want to do a model poem as a class on the board first. This can, for example, be about a hunger-free city or neighborhood (or another theme of choice). Ask students to help you envision this. Explore what this dream would look like, who would be affected, what the realization of this dream would allow people to do, and a way (or ways) that it would be accomplished that can involve everyone.

If you are working with students in their cooperative learning teams, you might want to assign each group one of the five basic essentials (food, water, air, shelter, and space). They can then brainstorm all the problems they learned about at Academia that have to do with this essential resource (e.g. water = acid rain, polluted watersheds, etc.) If they want to, they can focus on a specific problem under this essential resource that is currently strongly affecting their community. They can then continue as above.

Centro de trabajo 3: Nuestro mundo creativo: "Sueña un mundo"

Los estudiantes en este centro de trabajo escribirán un poema similar al discurso titulado "Yo tengo un sueño" del Dr. Martin Luther King, Jr.

Antes de escribir el poema lea o escuche el discurso con los estudiantes. (El discurso está disponible en video o casete.) Después de escuchar o leer el discurso en la clase, usted puede discutir éste y pedir a los estudiantes que escriban su propio "poema de sueños" acerca de algún problema ambiental epecífico que tenga interés especial para ellos. (Si los estudiantes son pequeños, divídalos en grupos cooperativos de aprendizaje para que hagan un poema a base de grupo).

Sería buena idea hacer un modelo en la pizarra primero. Por ejemplo, este podría ser un poema acerca de una ciudad o vecindario libre de hambre (o pueden escoger otro tema de su agrado). Pida a los estudiantes que lo/a ayuden a usted a imaginar esto. Examine la apariencia de este sueño: ¿quién podría ser afectado? ¿qué obtendría la gente si se realizara este sueño? ¿qué les permitiría hacer y qué formas permitiría involucrar a todos para realizarlo?

Si está trabajando con estudiantes que están en grupos de aprendizaje cooperativo, puede asignar a cada grupo uno de los cinco elementos básicos cómo (comida, agua, aire, resguardo, y espacio). Después, pueden repasar todos los problemas que han aprendido en la Academia que tienen que ver con estos recursos elementales (cómo agua=lluvia ácida, vertientes contaminadas, etc.) Si ellos desean pueden enfocarse en un problema específico que implique este recurso y que esté afectando bastante su comunidad.

Closing (10 minutes)

Praise the class for the hard work they completed today and during all previous lessons and units. Tell students that they have done a very good job in exploring some very difficult concepts — concepts that are math and science-related. In the time remaining, ask a few volunteers to recall some of the concepts they learned during the year. Then, ask students to share their "Dream a World" poems. (Make sure that, after this lesson, poems are posted around the classroom.)

Remind students that they still need to recycle their cans, and that they will meet one more time to enjoy the benefits of recycling and helping the environment!

Lastly, plan a closing activity where parents and students can come together to celebrate the end of Academia. (This can be connected to how students choose to spend their recycling money.) A party or field trip are some examples of fun activities that can involve everyone.

Handout 53.1

Unit Review of Vocabulary
Repaso de vocabulario

1.	characteristics	1.	características
2.	statistics	2.	estadísticas
3.	length	3.	largo
4.	width	4.	ancho
5.	circumference	5.	circunferencia
6.	median	6.	promedio
7.	genetics	7.	genética
8.	inherited	8.	herencia
9.	hereditary	9.	hereditaria
10.	probability	10.	probabilidad
11.	artifact	11.	artefacto
12.	archaeology	12.	arqueología

Appendix A

Unit and Lesson Planning Sheets

Working with students and doing activities requires planning and preparation. Having everything ready ahead of time and being organized can make the difference between an enjoyable learning experience and chaos.

1. Try the activity yourself first. This will help you think of ways to improve or adapt the activity to your students. It will also help to identify any trouble spots or need for extra planning.
2. Get supplies ahead of time. Make sure that you have plenty of everything. Have extras on hand in case students make mistakes or want to try something more than once.
3. Set the room up in advance. Use large, flat tables for doing hands-on work; one for every two to four students.
4. Confirm and prepare guest speakers for upcoming lessons.

Each of the six units that are part of the *Academia del Pueblo-MAS* curriculum are composed of a series of lessons. Each lesson is generally presented over two or more sessions or class days. Planning sheets are offered as tools for managing the schedule and the variety of activities that will be conducted over the period of weeks and months.

UNIT-AT-A-GLACE. This planning sheet gives the teacher a way to propose a schedule for the whole unit and all of its lessons. By having a "calendar" of months, dates, and lessons/sessions, the teacher can anticipate when s/he will need to bring in speakers, purchase materials, etc. Also, it is important that the teacher plug in important dates to remember: days that the program will be closed or no classes will be held, days when classes will be shorter or longer, or moved to a different time, date or location for field trips, etc. Special events — such as holiday parties, community/cultural events, PAP parent/program meetings, an open house — should be included on the curriculum calendar in order to make sure that you are able to take advantage of "linking" opportunities. The completed Unit-At-A-Glance form can be copied and distributed to staff and volunteers as well as posted in the classroom to help give the students a sense of parent/family, cultural, and non-classroom related events.

NO SE TE OLVIDE-THINGS TO DO. This form is included to help you plan for each lesson. Feel free to copy and modify the form as needed for your program. The customized form can be especially useful during the preplanning meetings with staff and volunteers. Copies of the completed forms can be given to staff/volunteers and may be posted on bulletin boards in order to serve as a reminder of deadlines for things that need to be done as well as a way to "catch" new items that must be done, but had not been considered during the original planning process.

Unit-At-A-Glance

Unit #__________ **Title:**______________________________

Lesson #s______________________________

No. of Sessions/Class Days____________________

Month(s)____________ **Class Dates**____________________

Days (Circle) M T W T F S

Time__________ **to**__________

Teacher:____________________ **Phone:**________________

Assistant/Volunteer:________________ **Phone:**________________

	Sun	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**No se te olvide. Important events and activities**
Lesson # ____ (Session ____)								
Lesson # ____ (Session ____)								
Lesson # ____ (Session ____)								
Lesson # ____ (Session ____)								
Lesson # ____ (Session ____)								
Lesson # ____ (Session ____)								
Lesson # ____ (Session ____)								
Lesson # ____ (Session ____)								
Lesson # ____ (Session ____)								

No se te olvide - Things to Do

Lesson____________ Title____

ITEM	**DATE**	**DEADLINES**
Contact and confirm resource person	________	(1 month before)
Name:______________________________		
Organization:_________________________		
Phone:____________Fax:____________		
Meet with teaching staff/volunteers to review upcoming unit/lessons, define roles, clarify assignments, etc.	________	(1 month before)
Communicate and brainstorm with parents	________	(2 weeks before)
Collect/purchase/copy materials	________	(1 week before)
List:______________________________		
___________________________________		
___________________________________		
___________________________________		
___________________________________		
Set up room/workstations		(1 day before)
Other Items:_________________________	________	________________
___________________________________	________	________________
___________________________________	________	________________
___________________________________	________	________________
___________________________________	________	________________

Why do the work twice?
Photocopy this list to use with each lesson

Also

- ☆ Plan ahead for speakers in lessons/units coming up
- ☆ Review instructions
- ☆ Make or return telephone calls

Appendix B

Teacher's and Leader's Role

The first thing to know is that you don't have to be a language teacher, a mathematician, or a scientist to help students learn and enjoy reading, writing, math, or science. The activities included in this curriculum are designed to be used by adult leaders/teachers in a variety of ways. Depending on your own personality and style of working with students, you can be:

- ☆ **A leader** — showing students how to do their best.
- ☆ **A partner** — working together, sharing ideas and discoveries.
- ☆ **A coach** — encouraging and demonstrating whenever necessary.
- ☆ **A friend** — supporting students who are uneasy or anxious.
- ☆ **A "parent"** — caring about students.
- ☆ **A manager** — Planning and coordinating students' activities.
- ☆ **A role model** — being interested and excited about learning, writing, reading, and constructing your own knowledge.

Most of all, be yourself and model someone who enjoys getting involved and doing some work learning. Be willing to explore and make mistakes. Don't expect to be the authority or expert. Your attitude and energy are much more important. In the words of Jaime Escalante, "you've got to have *ganas*."

Appendix C
Wordbanks

The wordbank activities are designed to help students create their own vocabulary banks. Students "deposit" their words, creating vocabulary to be "withdrawn" as needed. These activities should function in the following manner:

- ☆ Each student needs his or her own "wordbank." Students can use a plastic recipe or file-card box. The boxes hold 3x5 cards easily, are inexpensive and compact, and can be decorated by the student. If you are working with students acquiring a second language (English or Spanish), get two different colored boxes — one for English and one for Spanish.
- ☆ Have the wordbanks, and materials to fill them, easily accessible to students. You should have blank 3x5 cards, markers, pencils, and dictionaries.
- ☆ Students choose which words to add to their wordbanks. If they already know the word — its meaning, use, and spelling — there is no particular reason for that word to be included. Students print the chosen words or terms on one side of a 3x5 card and write a definition in their own words on the back. They may also illustrate the word, if appropriate.
- ☆ Students can pair up with another student at the station to practice their new words — defining them, and/or spelling them.
- ☆ The volunteers or teaching staff can set up games to assist students in practicing the various words in their wordbanks.

Suggestions include:

- ☆ **Bingo** — Type of game where the students choose the pool of words to be included and fill in blank grids with some of the words to make individual bingo cards. The cards are then randomly distributed to the students in the group and one student serves as the caller, reading through the stack of cards until "bingo" is scored.
- ☆ **Pictionary** — Students form groups and compete against each other. They will select words and concepts from the wordbanks to make cards which teams will receive as their "pictionary" cards. This game works like "charades." One group will have a member draw a picture that represents the word on the pictionary card, and the others must try to guess the word within a certain time limit. You'll need an egg timer and newsprint paper and pencils or markers for drawing to play this game.
- ☆ **Fictionary** — Students in the first group prepare this game for the succeeding groups. Words and terms are selected from the wordbank, particularly those that you think might not be known well. On a card the students write four definitions, one which is true and three which are fabricated. The game is played by drawing a card, reading the word and its four definitions and having players or teams select the correct definition.
- ☆ **Spelling Bees —** Old-fashioned spelling bees using the words in the wordbank.

☆ **Were the Action Is** — Choose a group of verbs and see if students (singly or in teams) can act out the verb. This is played like charades.

☆ **Scavenger Hunt** — Bring in old magazines and newspapers and award points to the team or individual that can find the greatest number of wordbank words. These can be cut out and pasted to the back of the wordbank cards.

By the end of the curriculum the students will have been exposed to a large number of new terms and concepts. Wordbank activities are designed to ensure that these words become a natural and familiar part of their vocabularies.

Appendix D
Work Stations

This curriculum makes extensive use of cooperative learning groups at work stations, with specific kinds of activities suggested for each station. Some lessons are structured to include three work stations with different activities occuring simultaneously in different parts of the room, with the cooperative learning groups rotating through each station. This has the advantage of providing students with the opportunity to work in small groups with low student to adult ratios.

Even when the activities appear to be "games," they are instructional games with a specific purpose. The purpose of each station is clearly spelled out at the beginning of each lesson. Although these activities are designed to be fun, they are a serious part of the curriculum, so treat them with that importance.

Physically, you need several different areas for work stations — as far apart as your space allows. You'll also need a timer so that you and the students know when it's time to move on. Expect noise — that's part of the process. Besides, there's something unnatural about a silent after-school program for children. If students are animated discussing or arguing about the topic at hand, they're probably actively learning, so don't worry about silencing them. You will need some kind of "all quiet" signal to restore order when it's time to conclude, however.

If you have not used work stations before, don't panic. After you set them up they are no more complicated or labor-intensive than delivering instruction to a whole group. In fact, many teachers find them less taxing. Typically, the teacher takes responsibility for one work station and tutors, teaching assistants or volunteers supervise the other. However, if it's just you and the students, don't automatically rule out using work stations. Many of the work stations tasks can be done without adult supervision once you establish routines for the students. Occasional volunteers or older students can often be helpful as well.

Remember that when you work in workstation you are also using cooperative learning techniques.

Doing Activities

The key to being an effective adult leader is to let students do things by themselves. Sometimes that means showing how, with a minimum of telling how. Remember your roles as a coach, manager, and partner. Encourage students to help each other and to try things out before they turn to you for help.

1. Use objects and materials. Most of these are suggested in the lessons, but feel free to adapt and use materials that are more suitable or more readily available. But don't try to avoid the materials and hands-on work.
2. Emphasize cooperation and group effort. Let students do their individual work, but encourage them to share ideas and help each other.
3. Focus on relationships, ideas, and why things work. Let students explain what they do. Encourage them to question and find out why things happen, not to accept an answer without understanding how they got it.

4. Take your time. It is best to spend enough time so that everyone understands and enjoys an activity. Rushing along to cover more material can be frustrating to both you and the students. Try not to push too far, too fast. It is better to stop while everyone is enjoying themselves, saving some anticipation for continuing the next time.
5. Avoid long, complicated paper and pencil calculating. Have a calculator handy. In most cases, the actual calculation is not as important as how and why to combine the numbers. If students understand that, they can push the right buttons on the calculator.
6. Avoid speed contests and competition. Students can sometimes be motivated by competition, but the activities are designed to emphasize reflective thought and problem solving.

Asking Questions

Some of the best teachers provide very little direct information to students. Instead they ask questions and help students to discover for themselves. Practice asking questions that require more than just a "yes" or "no" answer. When you ask a question, **wait for an answer**, don't answer it yourself right away. Here are the kinds of questions you should try to ask:

☆ How did you figure that out?
☆ Why does it work that way?
☆ How do you know?
☆ Is there another way to do it?
☆ What do you like about doing this?

Appendix E
Cooperative Learning

Philosophy and Use

"Cooperative Learning" approaches and activities promote and encourage students to work in groups on learning tasks. These activities help students learn to work with others, and take advantage of many students' cultural orientation to work cooperatively. These techniques do not replace competitive structures. Students do need to learn how to survive and thrive in competitive environments. These techniques are designed to complement competitive strategies.

Activities that allow students to work together to solve problems or learn ideas also help students relate in a democratic and respectful way to their peers and to adults. Cooperative learning exercises honor the value of each person and their contribution to the learning process. Since most of life is lived in a social setting, students benefit from experiencing the give and take necessary to work well in a group.

Paolo Freire, the respected Brazilian educator, speaks of a humanizing and liberating education. His methods stress the right and ability of everyone in the group to think and express an opinion in order to allow students to discover that everyone has something to give, that there are different perspectives and opinions on issues, and that all of these can be respected and listened to even when the final group conclusion does not include some of them.

Needless to say, there is a place for competition and competitive strategies also — they add excitement, interest, and often result in superior performance. We are using cooperative methods to expose students to additional skills, often less frequently used modes of learning and relating so that they can choose for each task the most appropriate way of working.

Numerous research studies have shown that cooperative learning has a variety of positive outcomes. For our purposes, some of the most important of these are:

- ☆ Academic Gains — students from diverse cultures and languages other than English make particularly good gains in classrooms that include cooperative learning approaches.
- ☆ Improved Race Relations — students learn to appreciate cultural and ethnic diversity in integrated classrooms.
- ☆ Communication and Problem Solving — Opportunities to work cooperatively help students develop better skills for getting along with others.

There is also evidence that cooperative learning helps increase students' self-esteem and liking for school and learning.

There are a variety of reasons why these strategies are effective. Students have more time to talk about what they are learning, becoming active learners rather than passive listeners to the teacher. Students also take more direct responsibility for teaching each other and receiving help from others. This provides more time to practice and to use the concept or idea they are learning.

The cooperative approach also encourages peer support — one of the most powerful motivators for many students, particularly adolescents. Since teachers in cooperative learning situations are not responsible for always lecturing and directing the action, they can more easily give help to students who need special attention. Teachers are not forced to constantly fight against students' urges to interact with their peers — a powerful urge for adolescents.

Cooperative learning may also be more compatible with the culture and values of some students — particularly Hispanic students. According to Spencer Kagan:

> Students who value helping and sharing will find achievement rewarding in a cooperative classroom whereas they will have little motivation to achieve if achievement is associated only with gains for themselves. Considerable research demonstrates that minority students are relatively more cooperative than majority students in their social orientation. Thus, the particularly strong gains of minority students in cooperative classrooms may be due to the compatibility of the classroom structure with the individual social values of minority students. The choice of an exclusively competitive and individualistic classroom structure may bias academic and social outcomes against the achievement of minority students.
>
> A final important reason for the need to help students develop cooperative skills is the fact that in adult life and in the world of work people need to who know how to work together and get along with each other. Our students must learn to thrive in a world of work which almost always requires teamwork. These skills are lacking in most new workers. In fact, the most frequently-cited reason for losing a first job is the lack of ability to get along with co-workers and supervisors, or limited skills in cooperating as a team.

Getting Started

In order to use cooperative learning effectively, you will need to divide the students into "mixed" working groups. In other words, divide the groups to include students with diverse abilities and achievement levels. If possible, there should be a high achiever, a low achiever and several "average" students. Groups should also be mixed in other ways which might normally separate students (race, national origin, gender, language background, school attended, etc.).

Keep the groups together long enough to complete specific tasks in the units, but plan on regrouping at least once or twice per year. This allows you to respond to any imbalances or personality conflicts that cannot be resolved in the group process.

Once the students have been assigned to groups, encourage them to develop a group identity and practice some skills for working together. They should select a name for their group, develop a group banner, or symbol, etc.

Remember that working cooperatively or in teams may not be a task with which all students are familiar or skilled in. As the teacher, you can help by setting up orientation activities so that the students feel comfortable working in groups and develop the skills to succeed.

Some people find it helpful initially to give each student a particular role to play in the group, so that the most "outgoing" students or those who are most proficient in English do not dominate the group. Shift the roles around frequently. Remember, these "team assignments" are not leadership roles, but are ways to develop different types of responsibilities. Allow students to practice a variety of roles and let them know that each is valuable to the functioning of the team, and each is accountable for the team's success.

Roles that can be assigned include:

☆ **Facilitator** — the person responsible for organizing the work of the group, being sure it stays on task, and encouraging everyone to participate.

☆ **Recorder** — the person who takes notes, writes ideas on newsprint or prepares the newsprint to be used to report on the work of the group.

☆ **Timekeeper** — the person who keeps their eye on the time, and encourages the group to keep moving in order to complete all of its tasks within the time available. This role is especially useful when the group has a tight deadline and a number of different tasks to complete. In a group of four, the timekeeper may also serve as observer.

☆ **Observer** — the person who watches the group process. The observer can offer insight on how the group interacted and identify its successes and problems. While the reporter shares content, the observer can share "process" with the full group.

Another technique to teach cooperation among group members is giving a limited amount of supplies to each group, forcing them to share the resources. When each group member has his or her own paper and pencil, it is easier for members to work individually rather than together. Sharing materials usually means sharing learning and responsibility.

Reward Structures

There are a variety of ways to reward students and groups for correct answers and appropriate behaviors. Provide both group and individual recognition. Team rewards are appropriate for the demonstration of good cooperative skills or tasks accomplished as a team. Encourage students to affirm and acknowledge the success of others as well as their own.

Balance competition and cooperation. It's o.k. to set up a competitive structure between teams — awarding teams points for correct answers in Numbered Heads Together discussed below, for example. But to avoid splintering your classroom into a bunch of warring city states, try to keep the rewards tied to the whole class.

Try the following reward structure. Get a large bottle or container (bottled water containers are good for this). When you award points to teams (for example, for correct responses when you use Numbered Heads Together, or for particularly effective working behaviors), keep track of the points on some kind of team chart, but also drop a few beans into the jar. Tell the class that when the beans reach some level on the jar (or fill the jar), there will be a class reward — a party, pizza, or some other activity that students choose (and you can afford!). This gives everybody the incentive to try to add points/beans to the jar, and the beans serve as a visible reminder of all the positive things that the students have already accomplished.

Another nice feature about using beans in a jar, is that it leads to a naturally occurring discussion about estimating the number of beans in the jar, and some math activities later in the curriculum.

Techniques

There are a number of cooperative learning techniques that you can use with adolescents. There are many books you can choose from to learn about these. Check with your local school district's resource library or consult your local public library.

Two cooperative learning techniques used throughout this curriculum include Numbered Heads Together and Brainstorming. They are discussed here to help you get started.

Number Heads Together

This a good technique for going over material presented in lecture or in a reading. Give each student in the group a number (one through four or five, for example). When you are discussing information, stop and ask questions of the group:

> "What do you think was the most important thing that happened in the story we just read? Put your heads together and consult with your group."

Students have a great incentive to make sure that every member of the group can answer the question because only one member will be called upon to respond for the group, and no one knows which number will be called. When the students have had some time to talk, give a signal to stop conversation and call out a number. For example, if you called out "number two," anyone with that number could raise his or her hand to give the answer. The teacher or facilitator selects who to call on and that person represents their group, winning points and/or recognition for the group if s/he answers correctly. This technique is helpful to recall information and it also provides students the opportunity to "put their heads together" and talk about possible implications or interpretations.

Brainstorming

This is a way that the group can get out as many ideas as possible in a short period of time. The key is to allow everyone to get their ideas out freely, without stopping to evaluate any particular one. The emphasis is on quantity of ideas. The first couple of times that you use the brainstorm technique, remind the students that the basic goal is to end up with a broad range of answers or ideas and possibilities.

- ☆ All ideas will be written down on a sheet of paper, or newsprint so that everyone can see the list developing.
- ☆ Give the recorder time to write the idea before jumping to a new one.
- ☆ Everyone's suggestions/answers are valid.
- ☆ Duplicate or similar suggestions/answers are okay.

At the end of the time available, the teacher may, depending on the task, ask the group to prioritize or select one or more of the answers and expand on it.

Appendix F

Language Experience and Cooperative Text Approaches

Overview

Language development — strengthening reading and writing skills, and developing vocabulary — is a strong focus of Project EXCEL. As you will note when you look through the curriculum, there is an emphasis on incorporating student writing, and vocabulary development, as well as an emphasis on developing higher order skills such as interpreting and analyzing information and applying it to new situations.

Successful implementation of the curriculum will depend upon the lead teacher being familiar with the Language Experience Approach, and being able to provide training in this approach to other teachers, teaching assistants, and volunteers. The adults in the program will need to understand the methodology and how to apply it to new situations.

Language Experience Approach

The Language Experience Approach to language development is used throughout the curriculum. This approach is based on the idea that anything which can be talked about can be written about.

There are four basic phases of writing using the Language Experience Approach — Discussion Phase, Drafting Phase, Revising Phase, and Editing Phase. Each is described below.

(1) Discussion Phase

The teacher talks with the students about the topic, making sure that students actively participate in the discussion. This phase allows the students to practice oral skills as they respond to the topic being discussed and ask questions to clarify meaning and understanding. Discussion is a very important phase. Explore ideas and different opinions and points of view. Jot down some of the significant or main words the students use (ask them to identify which of their words they think convey the important meanings).

When this approach is used to provide instruction in Spanish, be sure to conduct the discussion in Spanish as well.

(2) Drafting Phase

At this phase, the important thing is to have the students begin to put the ideas they've been talking about down on paper — to tell the story. The first draft may be either a cooperative or an individual text. Students are putting into written expression their understanding of what they heard and discussed, and their own reactions to the discussion. Students can be reminded that what we can talk about, we can write about. Group stories or texts can be written with each child contributing a sentence, or with groups providing the main ideas. Tell the students not to worry about grammar at this point (and resist the temptation to stop, correct sentences, or offer grammar lessons along the way).

(3) Revising Phase

This phase takes place when the students clarify their ideas and test them for clarity by reading them to their peers and rewriting their draft. Their peers and the teacher can help students discover whether or not they have effectively communicated their ideas. Help students understand that people revise things all the time, sometimes several times before they are satisfied that they have captured their ideas.

(4) Editing Phase

The final phase is done when students check grammatical form, and the mechanics of their work. Notice that this is done last so that students don't become so anxious about usage, syntax and spelling that they forget what they wanted to say in the first place. Editing can be done by the teacher, with the class by teaching assistants, or by students editing their peers work. The teacher may take one student's text, or the cooperative text, and explain editing in somewhat the following manner:

> Let's see how we can help people understand exactly what we mean. Capital letters and periods show where a new thought begins or ends. What other signs do we need to put in that will help put across our idea?

The teacher can elicit and/or provide whatever mechanics are needed. The strategy is to model formatting with a real story rather than to introduce capitalization and punctuation in isolation. Students need to understand clearly the function of punctuation and capitalization, but also to understand that they are common forms which make their ideas easier for readers to understand, not the most important part of writing.

The Cooperative Text Technique

The cooperative text technique is a teaching method used to encourage and assist the easy flow of the initial efforts of beginning writers. The teacher will elicit sentences on a given topic from the class and write them on the board. The class "builds" the text — providing the ideas without having to worry about spelling or mechanics or printing skills.

The writing phase is preceded by oral discussion of the topic. Sometimes questions from the teacher also guide the sequential development of the text.

For Academia, this technique may prove especially useful at the beginning. If students are reluctant to begin writing or not confident about their printing or spelling skills, the cooperative text technique may help them to get their ideas out. Students often need to see how to "compose" a text. Students benefit from the experience that the "ideas" are the essence of writing a composition, not the mechanics.

The cooperative text technique can be used until students feel confident enough to begin writing individual texts. When students have limited reading and writing skills, they may need to do cooperative texts for a longer period. On the other hand, they may be anxious to try their own story.

Try a cooperative text approach for the first lesson and see how it works for you and the students. Later, if individual writing becomes slow or "boring," a cooperative story may be a way of refreshing the students' interest. Returning to the cooperative text technique periodically can be helpful in other ways. It can help students learn to listen to the suggestions of others, hear different ways of phrasing ideas, and learn to work in a group.

Appendix G
Problem Solving Skills

Gerald Kulm from the American Association for the Advancement of Science (AAAS) offers the following information about mathematics in after-school programs and provides specific suggestions for leaders of community-based programs involving math.

About Mathematics

It is important that students develop the mathematical skills and concepts they need for algebra and other high school courses. But unless they learn to enjoy mathematical thinking and see the usefulness of math, many students are unlikely to reach their potential.

Students often think of math as being only about numbers. They see it as abstract and difficult with no useful applications. But in real life, math involves:

- ☆ **Estimating** - finding an answer that is "close enough." Most real problems don't have just one exact answer.
- ☆ **Finding Information** - looking at a situation and figuring out what to do and what strategy to use is more important than "crunching numbers."
- ☆ **Planning** - knowing what to do first and what steps to follow is the way real math problems are solved.
- ☆ **Visualizing** - being able to picture a situation or problem and represent it in a drawing or diagram.

All too often, the mathematics that students learn in school is mostly rules and memorization. There is no question that really learning and understanding anything, including mathematics, involves hard work and effort. But hard work can also bring the enjoyment of discovery and the satisfaction of having solved a problem.

The activities in the *Academia del Pueblo-MAS* curriculum are intended to show that learning mathematics can be enjoyable. Learning mathematics this way can involve:

- ☆ **Cooperation** - working together to solve a problem, not competing to see who can finish it first.
- ☆ **Enjoyment** - experiencing success in solving a problem or learning a new idea.
- ☆ **Hands-on activity** - measuring, drawing, building things.
- ☆ **Real Life applications** - using math to explore ideas and solve problems that occur in everyday life.
- ☆ **Seeing patterns** - exploring the design, size and shape of objects and ideas.
- ☆ **Problem solving** - using common sense, trial and error, and reasoning to find answers to questions.

The intent of *Academia del Pueblo-MAS* math activities is to help students gain experience that will motivate and encourage further interest and study of mathematics; not to remediate or compensate for skills not taught or mastered in school.

Appendix H

Index to Curriculum Handouts

1.1 Our World Puzzle
4.1 Secret Pal Game Questionnaire
6.1 Roller Derby Chart
7.1 Unit Review of Vocabulary
8.1 Lizard Strip Pattern
11.1 Best Beak Graph
12.1 Task Cards
16.1 Bat Counter and Bat Fan Button Pattern
17.1 Character Descriptors
17.2 Working List of Endangered Animals
17.3 Resource Organizations: Endangered Wildlife Information
20.1 Puffy Pigs
21.1 WonderScience Construction Challenge: Reach for the Sky
21.2 WonderScience Construction Challenge: Beam Me Up!
21.3 WonderScience Construction Challenge: The Mighty Dome I
21.4 WonderScience Construction Challenge: The Mighty Dome II
21.5 WonderScience Construction Challenge: Recording Our Results
24.1 Unit Review of Vocabulary
24.2 Susan Milord's "Play Shadow Tag"
26.1 The Sun: Braintwister
27.1 Susan Milord's "Make Fruit Leather"
29.1 Eco-Cube Pattern
31.1 A Poem by Darrel Daniel St. Clair
31.2 N. Scott Momaday's "The Delight Song of Tsoai-Talee"
31.3 Papermaking Terms
32.1 River Systems
32.2 Home Action Plan
33.1 Watershed Woes Worksheet
35.1 The Gummi Bear™ Population
35.2 Parent Link Family Activity: Pond Sample

36.1 Unit Review and Vocabulary
37.1 Susan Milord's "All Together Now"
38.1 Tallying Traffic
39.1 Jean Potter's "Water Quality Experiment: Is Rain Water Pure Water?"
41.1 Recording Temperatures
42.1 Average Global Temperatures
42.2 Jean Potter's "Erosion Stopper: Can Erosion be Prevented?"
43.1 The Watering Can Experiment
45.1 Unit Review of Vocabulary
45.2 Handmade Book Pattern Design
47.1 Footprints
48.1 Taking Measurements
49.1 The Punnett Square
53.1 Unit Review of Vocabulary

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Hostos, Eugenio María de. Diario, vol. I, Obras completas, 1939. *Para todos los días: Hostos, aforismos.* Ed. Julio César López. San Juan; Puerto Rico: Instituto de Cultura Puertorriqueña, 1988. Segunda edición. 47.

Kagan, Spencer. *Cooperative Learning.* San Juan Capistrano, CA: Kagan Cooperative Learning, 1992. 11, 16, 13.

Milord, Susan. *Hands Around the World.* Charlotte, VT: Williamson Publishing, 1992. 39, 52, 53.

National Science Foundation. *National Science & Techonology Week.* Arlington, VA: NSF, 1992-93.

Unit 4

Anzaldúa, Gloria. "I Change Myself..." Borderlands/La Frontera: The New Mestiza. *The Fire in Our Souls: Quotations of Wisdom and Inspiration by Latino Americans.* Ed. Rosie Gonzalez. New York, NY: Penguin/PLUME, 1996. 129, 153.

Galt, Margot Fortunato. "A Circle Poem of Praise in the Native American Spirit," in "The Story in History," *Teachers and Writers*, September-October 1992. Vol. 24, No.1. 1-3.

Milord, Susan. *Hands Around the World.* Charlotte, VT: Williamson Publishing, 1992. 79.

Momaday, N. Scott. "The Delight Song of Tsoai-Talee," in "The Story in History," *Teachers and Writers*, September-October 1992. Vol. 24, No. 1. 2.

National Science Foundation. *National Science and Technology Week.* Arlington, VA: NSF, 1990-93.

Paper Anew™, Woodrose Design, Chasley, Inc., Seattle, WA, 1992.

Potter, Jean. *Nature in a Nutshell for Kids.* New York, NY: John Wiley & Sons, Inc., 1995. 14, 21.

Project PRISM. *Homework is Part of Math and Science Success.* New York, NY: National Urban League, Inc., 198-.

Unit 5

Estés, Clarissa Pinkola. Women Who Run with the Wolves. *The Fire in Our Souls: Quotations of Wisdom and Inspiration by Latino Americans.* Ed. Rosie Gonzalez. New York, NY: Penguin/PLUME, 1996. 122, 157.

Kagan, Spencer. *Cooperative Learning.* San Juan Capistrano, CA: Kagan Cooperative Learning, 1992. 6:10. 10:11.

Milord, Susan. *Hands Around the World.* Charlotte, VT: Williamson Publishing, 1992. 85.

National Science Foundation. *National Science and Technology Week,* Arlington, VA: NSF, 1990.

Paper Anew™, Woodrose Design, Chasley, Inc., Seattle, WA, 1992.

Potter, Jean. *Nature in a Nutshell for Kids.* New York, NY: John Wiley & Sons, Inc., 1995. 16, 31.

Unit 6

Baca, Jimmy Santiago. This Is About Vision. *The Fire in Our Souls: Quotations of Wisdom and Inspiration by Latino Americans.* Ed. Rosie Gonzalez. New York, NY: Penguin/PLUME, 1996. 144, 153.

Mathematical Sciences Education Board and National Research Council. "The Hog Game" in *Measuring Up: Prototypes for Mathematics Assessment*. Washington, DC: National Academy Press, 1993.

Morales, Aurora Levins. "Child of the Americas," Barrios and Borderlands. *The Fire in Our Souls: Quotations of Wisdom and Inspiration by Latino Americans*. Ed. Rosie Gonzalez. New York, NY: Penguin/PLUME, 1996. 71, 165.

National Science Foundation. *National Science & Techonology Week*. Arlington, VA: NSF, 1992 and 1993.

Project PRISM. *Science and Math are for Girls*. New York, NY: National Urban League, Inc., 198-.

Appendix K
Additional Resources and Ordering Information

Publishers/Distributors:

The following publishers/distributors of books in Spanish and/or bilingual books are those cited throughout ADP-MAS in literature links.

Children's Book Press
6400 Hollis Street, Suite 4
Emeryville, CA 94608

Hispanic Book Distributors
1665 West Grant Road
Tucson, AZ 85745
Phone: (520) 690-0643
Fax: (520) 690-6574

Laredo Publishing
8907 Wilshire Blvd. #12
Beverly Hills, CA 90211
Phone: (310) 358-5288
Fax: (310) 358-5282

Lectorum
111 8th Avenue
New York, NY 10011
Phone: (212) 929-2833
Fax: (212) 727-3035

Teachers & Writers Collaborative
5 Union Square West
New York, NY 10003
Phone: (212) 691-6590
Fax: (212) 675-0171
http://www.twc.org

Publications and Programs:

The Best of the Latino Heritage: A Guide to
the Best Juvenile Books about Latino People and Cultures
Scarecrow Press
4720 Boston Way
Lanham, MD 20706
(800) 462-6420

This concise reference work, developed by Isabel Schon, identifies books that provide K-12 students with an understanding of the cultures of Latino people. The books referenced here offer insight into and appreciation for the people, history, art, politics, and society of Central and South America, Mexico, Spain, Puerto Rico, and Latino heritage in the United States.

Center for the Study of Books in Spanish for Children and Adolescents
California State University, San Marcos
Craven Call, 33 So. Twin Oaks Valley Road

San Marcos, CA 92096-0001
(760) 750-4070 - voice
(760) 750-4073 - fax
e-mail: ischon@mailhost1.csusm.edu
http://www.csusm.edu/campus_centers/csb/

Excellent resource for bilingual books and books in English and Spanish for Latino children and adolescents. Sponsors annual summer institutes for teachers. Has a Web Site with over 3,000 recommended books in English and Spanish (all currently in print), bibliographic information, grade level, subject headings, and annotations.

Eisenhower National Clearinghouse (ENC) for Mathematics and Science Education
Research for Better Schools
The Ohio State University
1929 Kenny Road
Columbus, OH 43210-1079
http://www.enc.org

General Information: (800) 621-5785 or (614) 292-7784
Technical Help Desk: (800) 621-5785 or (614) 292-9590
Reference Desk: (800) 621-5785 or (614) 292-9734
E-mail: help@enc.org

ENC serves all K-12 mathematics and science educators, parents and students with free products and services. It acquires and catalogs mathematics and science curriculum resources. (They have the most comprehensive collection in the nation.) ENC provides the best selection of math and science education resources on the Internet, supports teachers' professional development in math, science, and the effective use of technology, and collaborates with the National Network of Eisenhower Regional Consortia and many other organizations to promote education reform. ENC has a number of products and services available free of charge: ENC Online, Resource Finder online catalog, CD-ROMs, print catalogs, guides and other materials, demonstration sites located in connection with the Eisenhower Regional Consortia, and reference and technical assistance.

Excelling in Math and Science: Selected Programs of the U.S. Department of Education
U.S. Department of Education
Washington, DC 20208-5572
1-800-USA-LEARN

Family Math
EQUALS Program
Lawrence Hall of Science
University of California
Berkeley, California 94720-5200
(510) 642-1823

Family Math is a program developed by EQUALS, at the Lawrence Hall of Science, University of California at Berkeley. The goal of *Family Math* is to encourage underrepresented groups (especially girls and minority students) to enter careers that use mathematics.

A *Family Math* course lasts approximately 6 weeks. At every session, children come with their parents to a supportive agency in their community (church, community agency, library, museum, boys and girls club, recreation center). The EQUALS Program also provides training on *Family Math* implementation as well as other math-related topics. The program is described in the Family Math book. This book contains the full curriculum for *Family Math* courses, with activities and information appropriate for families at home, mathematics in-service, or for *Family Math* classes. It also contains information on establishing and conducting *Family Math* classes, including sample lesson plans and resource lists of mathematics materials. (Available in Spanish and English.)

Hot Water and Warm Homes from Sunlight
Great Explorations in Math and Science (GEMS)
Lawrence Hall of Science, #5200
University of California at Berkeley
Berkeley, CA 94720-5200
(510) 642-7771 - voice
(510) 643-0309 - fax

The Lawrence Hall of Science is an excellent resource publishing over 60 teacher's guides and handbooks that offer a wide spectrum of activity-based learning opportunities in math and science, from preschool and kindergarten through the tenth grade.

National Science and Technology Week (NSTW)
National Science Foundation (NSF)
4201 Wilson Boulevard, Room 1245
Arlington, VA 22230
(703) 306-1620
http://ntsw@nsf.gov

The National Science Foundation produces materials to be used during National Science and Technology week (held every April) in an effort to promote science, mathematics, and technology throughout the year. NSF serves as a science education resource for teachers, parents, and educators. Materials include activity packets, posters, and Internet/e-mail access to experts ready to answer math and science questions.

Learning By Doing
NAEP
CN 6710
Princeton, NJ 08514
(800) 223-0267

The Educational Testing Service, which conducts the National Assessment of Educational Progress, has released a manual for teaching and assessing higher order thinking skills. This is their first attempt to mold research into a form teachers and curriculum coordinators can put into practice. Single copies can be obtained free of charge by calling the telephone number above.

Paper Anew™
Woodrose Design
Chasley, Inc. (Distributor)
P.O. Box 19202
Seattle, WA 98109
Phone: (800) 888-2898
E-mail: chasley@ix.netcom.com

For information about the paper-making kit referenced in ADP-MAS and paper-making activities like those included here, please contact Woodrose Design.

Parents are Powerful
Center for Law and Education
1875 Connecticut Avenue NW, Suite 510
Washington, DC 20009
(202) 462-7688

This guide, published in 1996, is the new essential guide for parents and schools. Written in everyday language and in a magazine format, Parents are Powerful tells parents what they need to guide their children from preschool through high school. It reminds parents that they have more impact than anyone else on how well their children do in school and in life. Organized by age range, there are special sections for parents with children in pre-school, elementary, middle/junior, and high school.

The guide also includes information on standards, federal programs, legal rights, and other areas of importance to parents. The guide is available in Spanish and in English for $5.00 per copy. Call for bulk order information.

Principled Practice in Mathematics & Science Education
National Center for Improving Student Learning and Achievement in Mathematics and Science
Wisconsin Center for Education Research
School of Education, University of Wisconsin-Madison
1025 West Johnson Street
Madison, WI 53706
Phone: (608) 263-3406
Fax: (608) 263-3406
Email: ncisla@mail.soemadison.wisc.edu
http://www.wcer.wisc.edu/ncisla

The Center's mission is to craft, implement in schools, and validate a set of principles for designing classrooms that promote student understanding in mathematics and science. They conduct a sustained program of research and development in school classrooms, in collaboration with school staff, to: identify a set of design principles; demonstrate, in classrooms, the impact of the design principles on student achievement; clarify how schools can be organized to support teaching for understanding; develop a theory of instruction related to teaching for understanding; and find ways to provide both infromation and procedures for policymakers, school administrators, and teachers so they can use our findings to create and sustain classrooms that promote student understanding. *Principled Practice in Mathematics & Science Education* is the Center's newsletter, and it is filled with excellent resources and articles that touch upon the themes noted above.

PRISM (Partners for Reform in Science and Mathematics)
The Annenberg/CPB Math and Science Collection
P.O. Box 2345
S. Burlington, VT 05407-2345
(800) 965-7373

A national partnership between NCLR, The National Urban League, Thirteen/WNET, and the National Center for Improving Science Education, PRISM was a three-year venture that produced multi-media materials in English and Spanish, and sponsored community-based math and science projects to help parents become more actively involved in ensuring that their children participate in high-quality math and science programs.

The materials are essentially an outreach kit for schools and communities and include a source book for facilitators with activities and scripts, parent handouts, and three 20 minute videos. The package is available from Annenberg/CPB for $43.15, including shipping and handling.

Science Linkages in the Community
American Association for the Advancement of Science
P.O. Box 631270
Baltimore, MD 21263-1270
1-800-351-7542
http:///www.aaas.org/ehr

The SLIC Institute offers conferences and seminars featuring prominent speakers and specialists in the field of science, mathematics, and technology education (these often include a wealth of materials and ready-to-implement activities). They provide technical assistance to groups interested in an extended initiative in their communities or in a school-based program science training initiative.

State of the Art: Transforming Ideas for Teaching and Learning Mathematics
Office of Research
U.S. Department of Education
OERI Education Information
555 New Jersey Avenue NW
Washington, D.C. 20208-5641

For single copies, please order from USDOE above. For bulk copies, please order from: U.S. Government Printing Office, Superintendent of Documents, SSOP, Washington, DC, 20402-9328; or call them at (202)783-3238.

WonderScience
American Chemical Society (ACS)
1155 16th Street, NW
Washington, DC 20036
1-800-333-9511

WonderScience materials include hands-on activities for elementary school children and are published as a joint effort of the American Chemical Society, the Chemical Manufacturers Association, and the American Institute of Physics.

Appendix L

Nature and Environmental Organizations

Your local library and the Internet are excellent sources of information about nature and for nature and environmental organizations. The list that follows offers a great starting place for the parent/student letter writing activities contained in Academia del Pueblo-MAS.

American Forests
P.O. Box 2000
Washington, DC 20013
(202) 955-4500
http://www.amfor.org

Center for Marine Conservation
1725 DeSales Street, NW, Suite 600
Washington, DC 20036
(202) 429-5609
http://www.cmc-ocean.org

Earth Day Network
91 Marion Street
Seattle, WA 98104
(206) 264-0114
http://www.earthday.net

The EnviroLink Network
5808 Forbes Avenue, Second Floor
Pittsburgh, PA 15217
(412) 420-6400
http://www.envirolink.org

Greenpeace USA
1436 U Street, NW
Washington, DC 20009
(202) 462-1177
http://www.greenpeace.org

International Wildlife Coalition
70 East Falmouth Highway
Falmouth, MA 02536
(506) 546-6326
http://www.iwc.org

National Audubon Society
700 Broadway
New York, NY 10003
(212) 979-3000
http://www.audubon.org

National Geographic Society
17th and M Streets, NW
Washington, DC 20036
(202) 857-7000
http://www.nationalgeographic.com

National Wildlife Federation
1400 16th Street, NW
Washington, DC 10036
(202) 797-6800
http://www.nwf.org

U.S. Department of Energy
Energy Efficiency and Renewable Energy Clearinghouse (EREC)
P.O. Box 3048
Merrifield, VA 22116
(800) 363-3732
http://www.eren.doe.gov/kids.html

Appendix M

Recommended Readings for Parents and Teachers

☆ Apelman, Maja and Julie King. *Exploring Everyday Math: Ideas for Students, Teachers & Parents.* Portsmouth, NY: Heinemann, 1993. In this book teachers will find a wide variety of engaging ideas for making connections between mathematics and the daily lives of elementary school students. The book focuses on two powerful but often neglected teaching resources: the many day-to-day situations in which some form of mathematics is used, with or without the user's awareness, and parents, who can enrich their children's learning of mathematics by contributing their knowledge, interest, and ideas. The book is a guide for both these resources, providing plans for activities that center on the world of everyday family life.

☆ Borman, Jamie Lynne. Illus. Yvette Santiago Banek. *Computer Dictionary for Kids and their Parents.* Hauppauge, NY: Barron's Educational Series, 1995. A great resource, with relatively simple definitions, that was researched, designed, and edited and proofread with important assistance from kids.

☆ Cole, Robert W., Ed. *Educating Everybody's Children: Diverse Teaching Strategies for Diverse Learners, What Research and Practice Say About Improving Achievement.* Alexandria, VA: Association for Supervision and Curriculum Development, 1995. This book serves as a practical guide to developing school programs that meet the needs of students from diverse cultural, ethnic, linguistic, and socioeconomic backgrounds. One author discusses strategies that work across the curriculum, while others discuss strategies specific to reading, writing, mathematics and oral communication. Every strategy includes classroom examples and a list of the research studies that support it.

☆ Gibson, Gary. *Science for Fun Experiments with Easy-to-Make Projects on Magnets, Sound, Light Electricity and Much More.* Brookfield, CT: Copper Beech Books, 1996. A guide of hands-on, fun experiments, written clearly and simply, with explanations of why they work, and ideas for further activities.

☆ Hixson, B.K. and M.S. Kralik. *Jr. Boom Academy.* The Wild Goose Company, 1992. This fabulous, humorous book is written in plain English for both teachers and students. It includes 100 experiments that cover every conceivable elementary and middle school science objective, including acids and bases, solids, liquids and gases with "a little bit of 'Hollywood' thrown in for education through entertainment." Ages 9 and up.

☆ Kenda, Margaret and Phyllis S. Williams. Illus. Tim Robinson. *Math Wizardry for Kids.* Hauppauge, NY: Barron's Educational Series, Inc., 1995. This book includes projects, puzzles games and designs for children to try on their own and find the magic in math. The emphasis is on fun, but the book is also great for classroom projects, and includes a special section for parents and teachers.

☆ Kohl, Herbert. *Insides, Outsides, Loops and Lines.* New York, NY: Scientific American Books for Young Readers, W.H. Freeman & Company, 1995. This book looks at the fun day-to-day applications of math through hands-on arts activities on closed curves, using maps and gardens, and expanding simple patterns into complex ones by drawing Lusona, traditional patterns from Africa. For grades 4-6.

☆ Kohl, Mary Ann F. And Cindy Gainer. *Math Arts: Exploring Math through Art for 3 to 6 Year Olds.* Gryphon House, Inc., 1996. *Math Arts* takes an innovative approach that uses creative art projects to introduce pre-schoolers to math concepts. Each of the 195 hands-on projects is designed to help children discover essential math skills through a creative process that encourages children's natural development of math concepts. Using everyday materials, children learn the essential skills of sorting, matching, one-to-one correspondence, patterning, counting, measuring, number values and more. (The book is organized by age-appropriate level.).

☆ Aristoplay and WGBH Educational Foundation. Nova™ *True Science: Science Facts Stranger than Fiction.* Ann Arbor, MI: Aristoplay, 1993. Players wander around a Big Brain game board and earn points by answering simple true-false questions or tougher "genius" questions. The 900 questions fall into six science categories: "Life," "Earth," "Physics," "Technology," "Science & Society," and "Random Access." (2-4 players.) Ages 10 and up.

☆ Nye, Bill. *Bill Nye Science Guy's Big Blast of Science.* Mercer Island, WA: Addison-Wesley Publishers, 1993. Read about quarks, quasars and the questions scientists are still trying to figure out. Students can learn how to build mini electric motors, how light comes as both particles and waves, and how a television show arrives at the television set. Ages 10 and up.

☆ Opitz, Michael F. *Learning Centers: Getting Them Started, Keeping Them Going (K-4).* New York, NY: Scholastic, Inc.1994. This author describes the steps he followed in incorporating learning centers into his instructional practice. The strategies are easy to follow and include center topics, ideas for each month, basic frameworks that provide for change, ready-to-use center activities, floor plans, and sample schedules. Mr. Opitz's upbeat approach to this subject and the skills-based mini-lessons included in this book, make it an excellent resource for teachers who are approaching learning centers for the first time.

☆ Osborn, Susan. *Free, and Almost Free, Things for Teachers.* 4th Ed. New York, NY: Perigree Books/The Putnam Publishing Group, 1993. This excellent resource lists items (from photographs, to instructions for experiments, to workbooks, maps and charts) available to teachers for the price of a stamp or a maximum of five dollars.

☆ Potter, Jean. *Nature in a Nutshell for Kids: Over 100 Activities You Can Do in Ten Minutes or Less.* New York, NY: John Wiley & Sons, Inc., 1995. A fabulous book, divided into the four seasons, meant to be used directly by kids. It encourages finding resources for experiments in the home, backyard and neighborhood, and projects include detailed step-by-step instructions and illustrations. Among others, the activities cover plant and animal life, ecology, rocks and minerals, and the senses. For ages 8-12.

☆ Schon, Isabel and Sarah Corona Berkin. *Introducción a la literatura infantil y juvenil.* San Marcos, CA: Center for the Study of Books in Spanish for Children and Adolescents, California State University, 1996. A comprehensive bibliography of books listed at the appropriate reading level for beginning, intermediate, and young adult readers that includes titles from publishers in North and South America, as well as Spanish translations from English, German, French, and other languages.

☆ Sharp, Richard M., and Seymour Metzner. *The Sneaky Square and Other Math Activities for Kids* (expanded second edition). New York, NY: The McGraw-Hill Companies, Inc., 1996. This book is designed to arouse children's insterest in mathematical activities, provide practice in basic numbers operations, and encourage creative approaches to solving problems. Many of these can be built into an existing math curriculum or be used at home by parents. The activities are of varying difficulty and meant for children at various grade levels. However, they have been tested specifically in grade 3-8 classrooms. A section on reasoning and spatial relationships, "Geometricks," is particularly geared toward girls.

☆ Stenmark, Jean Kerr, Virginia Thompson, and Ruth Cossey. Illus. Marilyn Hill. *Family Math.* Berkeley, CA: Regents, University of California, Lawrence Hall of Science, 1986. This beautiful book about parents and children learning and working together, was prepared with the support of the U.S. Department of Education and the Carnegie Corporation of New York. It covers word problems, logical reasoning, measurement, geometry and spatial thinking, probability, statistics, calculators, estimation and other mathematics topics. For grades K-7.

☆ VanCleave, Janice. *Guide to the Best Science Fair Projects.* New York, NY: John Wiley & Sons, Inc., 1997. Students learn how to develop a topic from an idea, and the best ways to create, display, assemble and present projects. This guide provides experiments on topics from astronomy, biology, chemistry to math and engineering.

☆ Vermont Institute of Natural Science. *Hands-On Nature: Information and Activities for Exploring the Environment with Children.* Ed. Jenepher Lingelbach. Illus. Edward Epstein. Woodstock, Vermont: Vermont Institute of Natural Science, 1986. A compilation of interesting science activities (biology and ecology) and ways to relate them scientifically to other subject areas like language and fine arts. The activities can be used regardless of geographical locations, and range in grade level.

☆ White, Larry. *Energy: Simple Experiments for Young Scientists.* Brookfield, CT: The Millbrook Press, 1995. This book offers a rich array of learning-by-doing projects and experiments using inexpensive materials (as in for creating a "kitchen volcano") with a section on solar energy. Students learn about where energy comes from, its common forms, how one kind becomes another, etc. An excellent resource for both classroom and home. Recommended for grades 3-5.

☆ Zaslavsky, Claudia. *The Multicultural Math Classroom.* Portsmouth, NH: Heinemann, 1996. Zaslavsky's book explores mathematical ideas developed by various cultures to count objects, measure quantities, invent calendars, design works of art and even play games. Students learn that math was created by real people attempting to solve real problems. They're asked to solve these same kinds of problems and to extend their problem-solving to issues within their community. A "must" for elementary and middle school teachers.